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ELEMENTS OF

# Healthful Living

ELEMENTS OF HEALTHFUL LIVING



THE MAPLE PRESS COMPANY, YORK, PA.

*To*

*those who prefer*

*facts to fads, sanity to superstition,*

*understanding to*

*belief*

# PREFACE

RARELY if ever before have the youth of this nation been faced with so great a personal responsibility to be physically, mentally, and morally fit as during these critical years when the decision is being made as to whether our way of life shall be permitted to continue on this earth. We won two world wars after a terrific sacrifice of men, material, and money, but the peace of the world is still in the balance.

Early in the Second World War the American Council on Education summarized the opinions of responsible military and naval officers as to the courses that colleges and universities should stress in preparation for the part that their students would be called upon to play in the defense of our country. The two recommendations most commonly made were "that a more definite and consistent program for physical fitness should be developed and required of all students" and that these "potential leaders . . . should be not only physically fit but also be thoroughly informed on matters of personal health and hygiene."

For many years the National Educational Association and other educational groups have proclaimed that health is the first objective of education. The soundness of this objective is apparent when one realizes that further improvements in both personal and community health must come about primarily through a better understanding by everyone of the principles and practices of healthful living. To provide such understanding is a

major responsibility of the schools—elementary, secondary, and collegiate.

Some years ago, at the request of a number of college teachers, the author revised a book which had been written primarily for the general reader into a "Textbook of Healthful Living." This text has been cordially received, but some colleges allow so little time for instruction in personal and community hygiene that a briefer book of the same type was requested. This volume represents the author's response to these requests.

In the condensation of a book to half its original size it is obvious that much valuable material must be eliminated. Yet it has been possible to include in this abridgement the more essential aspects of both personal and community health. It is the author's hope that this abridged edition may make a further contribution toward a better preparation of college men and women to meet their personal and civic responsibilities in the field of health.

An important adjunct to this volume is the five sound motion pictures and five silent filmstrips which amplify the material in certain of the chapters of this book and interpret it through the visual medium. Individual films cover such subjects as: recommended routines to develop desirable personal health habits; description of the structure and function of body organs shown in animation sequences; the counterbalances to human disease; the reproductive systems of men and women, and the process of normal birth; and the establishment of psychiatric techniques as normal treatment for persistent emotional upsets. The motion pictures dramatize and explain these recommended routines and attitudes and are supplemented by the filmstrips which repeat in still-picture form the key points of the motion pictures.

To his colleagues and friends, the author wishes to express appreciation for many helpful suggestions in the preparation of this book; and to the several authors and publishers who have graciously granted permission to reproduce copyrighted material, he acknowledges his indebtedness.

HAROLD S. DIEHL

Minneapolis, Minn.
*April*, 1950

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# *Chapter* I

# THE IMPORTANCE AND THE POSSIBILITIES OF GOOD HEALTH

HUMAN life today is longer and healthier than ever before in the history of the world. Science has unraveled the mystery of one disease after another and the application of science has led to disease control until we can almost proclaim that anyone may have good health if he will follow the established rules of hygiene.

But can people be induced to be intelligent concerning health? There is abundant evidence that they will blindly follow fads which promise health of body or mind and that they will pour fortunes into the laps of unscrupulous charlatans who offer them panaceas for everything under the sun. But will they think? Have they the strength of mind to look critically at their health prejudices, hobbies, and fads? If so, they will find that living is fascinating and that the maintenance of health is much less difficult and mysterious than they have believed.

Health is a priceless treasure, but a treasure that is rarely appreciated until it is lost. On the basis of personal experience Thomas Carlyle wrote: "The healthy know not of their health but only the sick." Youth especially tends to take good health for granted and squander it thoughtlessly, little realizing that future success and happiness, and even life itself, are largely influenced and in many instances actually determined by the habits of living acquired during one's developmental years. Once

the accumulated effects of malnutrition, chronic fatigue, emotional instability, dissipation, tobacco and alcohol, and infections and infectious diseases have shown themselves in the form of chronic degenerative diseases, irreparable damage has been done.

> The Moving Finger writes; and, having writ,
> Moves on: nor all your Piety nor Wit
> Shall lure it back to cancel half a Line,
> Nor all your Tears wash out a Word of it.
> —*Omar Khayyám.*

## The Importance of Health

It is frequently said, and with considerable justice, that some persons enjoy ill-health. To these unfortunate persons their ailments become the most interesting and important things in life. They use them as their chief subjects of conversation and as a means of obtaining attention. Fortunately, such reactions are not common. Most of us enjoy good health. Without it our daily duties become burdens, the extra tasks and initiative upon which achievement and progress depend seem insuperable, zest for pleasure and recreation is lost, and life itself seems "hardly worth the candle." As Bickerstaff wrote: "Health is the greatest of all possessions—a hale cobbler is a better man than a sick king."

One cannot have good health always, and if sickness or physical disability becomes our lot we must make the best of it. A strong person is master of his disabilities instead of permitting them to become master of him. We are thrilled by those courageous spirits who, like the late President Roosevelt, are able to rise above physical handicaps. Yet for each one of these there are many others whose lives are ruined by physical disabilities, most of which are preventable or correctable.

## Health and the National Welfare

Health is such a personal matter that in normal times few persons think of it as being of national importance. Yet Disraeli, Queen Victoria's renowned and beloved Prime Minister of England, expressed his appreciation of this when he said: "The public health is the foundation upon which reposes the happiness

of the people and the strength of the nation. Care of the public health is the first duty of the state."

In times of national emergencies, on the other hand, everyone realizes that good health is essential for the national welfare and even the national existence. Illness destroys the effectiveness of the armed forces, hampers industrial production, undermines morale, and places an enormous burden upon a weakened populace.

Illustrative of the serious effects of illness upon our own national production is the report of the U.S. Public Health Service, which estimates that approximately 350,000,000 man-days are lost annually on account of illness and accidents among industrial workers in this country. This loss corresponds to the total working time of more than a million workingmen for a whole year. Translating this into terms of national defense production, the Surgeon General of the U.S. Public Health Service said:

> Not all of this can be prevented; but suppose we prevent 10% of this—a conservative estimate—what would be the result in defense production? Based on data from the Bureau of Labor Statistics, showing the man-hours required to produce various kinds of war material, I have calculated that a 10% reduction in industrial manpower losses from disability would build 12 cantonments of average size, 5 battleships, or 16,407 combat tanks. . . . Representative McCormack, of Massachusetts, made another comparison. He estimates that man-days lost to industry last year on account of disability are 50 times as great as those lost on account of strikes and lock-outs. We hear much about the latter but little of the former.[1]

Other extensive surveys of illness among industrial workers show that the average loss of time on account of illness is 8 days per year for men and 12 days per year for women. The sum of these individual disabilities makes the staggering total referred to above. Fortunately, much of this is preventable.

## The Health of Our Armed Forces

Reports from both the Army and Navy show a remarkably low record of illness during the Second World War. For the first

[1] Parran, Thomas, "The Function of Public Health in Defense," *Journal of the American Medical Association*, vol. 117, p. 186, July 19, 1941.

time in history during a mobilization of troops no serious epidemics of disease occurred in the training camps. Furthermore, in spite of the destructiveness of the weapons of modern war, 96 out of every 100 wounded men who reached the hospitals were saved.

This is a splendid record, but reports of the physical examinations under the Selective Training and Service Act present a different picture. Of the first million men who were given physical examinations, 380,000 were found unfit for general military service. Approximately half of these were classified as unfit for any military service and approximately half as physically qualified for only limited military service. An analysis of the conditions responsible for these rejections shows that they include mental deficiencies of various types as well as failure to meet minimum intelligence standards; also that many of the physical defects listed are not serious and are of little, if any, handicap in civilian life. In interpreting the results of examinations for military service it must be kept in mind that the purpose of these examinations is to select young men who can be trained for military combat under grueling conditions. Furthermore, standards for acceptance for service change in relation to the urgency of the need for manpower. It was said that in the early days of the Second World War only those in perfect physical condition were accepted but that toward the end of the war anyone who could tell night from day and had two teeth that "matched" was "in."

Table 1 shows the causes of rejection for military service of some 4,000,000 men during the Second World War. Commenting on this, Major General Lewis B. Hershey, Director of Selective Service, stated: "This is indicative of a general physical condition of this country's youth, of which we nationally should be thoroughly ashamed."

Many of the causes of rejection for military service are of minor importance and others are conditions which medical science does not know how to prevent or to correct. There is, however, sufficient truth in General Hershey's statement to make every loyal American resolve in the interest of national strength

## TABLE 1

PRINCIPAL CAUSES FOR REJECTION OF SELECTIVE SERVICE REGISTRANTS EIGHTEEN TO THIRTY-SEVEN YEARS OF AGE, JUNE 1, 1944*

| Principal Causes for Rejection | Number | | | Per cent | | |
|---|---|---|---|---|---|---|
| | Total | White† | Negro | Total | White† | Negro |
| Total | 4,217,000 | 3,393,000 | 824,000 | 100.0 | 100.0 | 100.0 |
| Manifestly disqualifying defects | 443,800 | 383,600 | 60,200 | 10.5 | 11.3 | 7.3 |
| Mental disease | 701,700 | 622,400 | 79,300 | 16.6 | 18.3 | 9.6 |
| Mental deficiency‡ | 532,100 | 322,700 | 259,400 | 13.8 | 9.5 | 31.5 |
| Physical defects | 2,426,500 | 2,013,400 | 413,100 | 57.6 | 59.4 | 50.1 |
| Musculoskeletal | 316,300 | 281,000 | 35,300 | 7.5 | 8.3 | 4.3 |
| Syphilis | 283,800 | 115,000 | 168,800 | 6.7 | 3.4 | 20.5 |
| Cardiovascular | 273,300 | 228,700 | 44,600 | 6.5 | 6.7 | 5.4 |
| Hernia | 238,400 | 211,900 | 26,500 | 5.7 | 6.3 | 3.2 |
| Neurological | 214,800 | 192,800 | 22,000 | 5.1 | 5.7 | 2.7 |
| Eyes | 212,700 | 188,700 | 24,000 | 5.0 | 5.6 | 2.9 |
| Ears | 162,900 | 158,300 | 4,600 | 3.9 | 4.7 | 0.6 |
| Tuberculosis | 113,200 | 101,700 | 11,500 | 2.7 | 3.0 | 1.4 |
| Lungs | 72,800 | 64,100 | 8,700 | 1.7 | 1.9 | 1.0 |
| Underweight and overweight | 62,200 | 57,900 | 4,300 | 1.5 | 1.7 | 0.5 |
| Feet | 54,000 | 42,000 | 12,000 | 1.3 | 1.2 | 1.5 |
| Abdominal viscera | 53,600 | 51,200 | 2,400 | 1.3 | 1.5 | 0.3 |
| Kidney and urinary | 44,200 | 40,100 | 4,100 | 1.0 | 1.2 | 0.5 |
| Varicose veins | 42,700 | 38,000 | 4,700 | 1.0 | 1.1 | 0.6 |
| Genitalia | 42,300 | 33,100 | 9,200 | 1.0 | 1.0 | 1.1 |
| Endocrine | 40,300 | 38,600 | 1,700 | 1.0 | 1.1 | 0.2 |
| Teeth | 36,100 | 33,800 | 2,300 | 0.9 | 1.0 | 0.3 |
| Tumors | 26,100 | 23,700 | 2,400 | 0.6 | 0.7 | 0.3 |
| Skin | 26,000 | 23,100 | 2,900 | 0.6 | 0.7 | 0.3 |
| Nose | 25,400 | 24,300 | 1,100 | 0.6 | 0.7 | 0.1 |
| Gonorrhea and other veneral diseases | 18,300 | 7,300 | 11,000 | 0.4 | 0.2 | 1.3 |
| Hemorrhoids | 17,200 | 14,400 | 2,800 | 0.4 | 0.4 | 0.3 |
| Mouth and gums | 11,100 | 10,300 | 800 | 0.3 | 0.3 | 0.1 |
| Infectious and parasitic | 4,500 | 3,900 | 600 | 0.1 | 0.1 | 0.1 |
| Other medical | 34,300 | 29,500 | 4,800 | 0.8 | 0.9 | 0.6 |
| Nonmedical | 62,900 | 50,900 | 12,000 | 1.5 | 1.5 | 1.5 |

* Preliminary report presented by Major-General Lewis B. Hershey and Colonel Leonard B. Rowntree before United States Senate Subcommittee on Wartime Health and Education, July 10, 1944. Published in *Congressional Record.*

† Includes all races other than Negro.

‡ Includes (1) registrants with more than one disqualifying defect who were rejected for educational deficiency prior to June 1, 1943; (2) registrants rejected for failure to meet minimum intelligence standards beginning June 1, 1943; (3) morons, imbeciles, and idiots rejected November, 1940, to April, 1944.

to do everything possible to improve the health and efficiency of our youth.

## Length of Life

There is no more brilliant achievement of man than the progress he has made in the prevention of disease and the prolongation of life. From superstition, ignorance, and early death man has advanced in a few centuries to an understanding and solution of most of his health problems.

Physicians can never eradicate death from the face of the earth; their function is to prolong life and to relieve pain. Death is not preventable, but some deaths are postponable. As more deaths are postponed to higher ages, the number of deaths per year will tend to increase. Therefore, the success of medical care and public health programs must be measured by the number of years the average person lives, not by the number of deaths that occur in any year.

In the sixteenth century the average length of life in western Europe is said to have been 19 years; in the seventeenth century, 25 years; in the eighteenth century, 32 years. In the nineteenth century in this country, life averaged approximately 40 years; at the beginning of the present century this average had increased to 49 years; and by the end of the first quarter of the twentieth century to approximately 57 years for men and 60 years for women. By 1946 this increase in life expectancy at birth in the United States had extended to 65.1 years for males and 70.3 years for females.

### PREVENTABLE CAUSES OF DEATH

Experts tell us that it should be possible to extend still more the life of the average individual. The question is, just how can this be accomplished? The answer requires definite information as to the diseases and conditions which in the main are responsible for destroying life before its biologic limit has been reached.

Mortality reports for the United States show that in 1946 the leading causes of death for all ages, in order of importance, were heart disease, cancer, apoplexy, accidents, chronic nephritis

(Bright's disease), diseases of early infancy and congenital malformations, pneumonia, tuberculosis, etc. At the beginning of the century the list of our favorite executioners was quite different, with tuberculosis in the lead and pneumonia, diarrhea and enteritis, and heart disease following in the order named.

The shifts in the relative importance of these diseases have been the result primarily of two factors: first, the reduction of the communicable diseases of infancy and childhood; and, second, the increase in the average age of our population. Men and

TABLE 2

CHANGES IN THE LEADING CAUSES OF DEATH IN THE UNITED STATES SINCE 1900

| 1900 | | 1946 | |
|---|---|---|---|
| Disease | Death Rate per 100,000 Population, All Ages | Disease | Death Rate per 100,000 Population, All Ages |
| Tuberculosis | 201.9 | Heart disease | 306.8 |
| Pneumonia | 180.5 | Cancer | 130.1 |
| Diarrhea and enteritis | 133.2 | Apoplexy* | 89.8 |
| Heart disease | 132.1 | Accidents | 70.1 |
| Diseases of early infancy and congenital malformations | 91.8 | Nephritis* | 58.4 |
| Nephritis | 89.0 | Diseases of early infancy and congenital malformations | 56.8 |
| Apoplexy | 71.5 | Pneumonia | 38.3 |
| Accidents | 65.4 | Tuberculosis | 36.4 |
| Cancer | 65.0 | Diabetes | 24.8 |
| Bronchitis | 45.7 | Arteriosclerosis* | 19.1 |
| Diphtheria | 43.3 | Suicide and homicide | 17.8 |
| Typhoid fever | 35.9 | Cirrhosis of the liver | 9.6 |
| Influenza | 22.9 | Syphilis | 9.3 |
| Peritonitis | 15.1 | Hernia, intestinal obstruction | 8.0 |
| Gastritis | 14.0 | Influenza | 6.3 |
| Diseases of pregnancy | 13.3 | Diarrhea and enteritis | 5.8 |
| Cirrhosis of the liver | 12.9 | Ulcer of stomach and duodenum | 5.8 |
| Measles | 12.5 | Diseases of the prostate | 5.3 |
| Hernia, intestinal obstruction | 12.2 | Appendicitis | 3.8 |
| Whooping cough | 12.1 | Diseases of pregnancy | 3.7 |

*"Apoplexy," also called "a stroke," is the medical term for hemorrhage into the brain; "nephritis," also called "Bright's disease," for inflammation of the kidney; and "arteriosclerosis," for hardening of the arteries.

women who have escaped the hazards of infancy and childhood are entering upon a period of life when they are confronted by hazards of a different character. This change is introducing new problems.

Only two of the leading causes of death today are communicable, namely, tuberculosis and pneumonia. Of the entire group it is only these two which show a downward trend, and of the two the downward trend is by far the more rapid in tuberculosis, whose communicable character is considerably greater than that of pneumonia.

Most of the other leading causes of death—heart disease, cancer, brain hemorrhage, and inflammation of the kidneys—present a radically different public health problem from that of the communicable diseases, for these are degenerative diseases. They represent the disintegration of the individual's vital machinery before the insidious accumulation of the relatively minor injuries of previous illnesses, of hereditary factors, and of personal habits, the total effect of which is too great for the individual to withstand. Man is mortal, and, though life is prolonged by evading acute illness, death must come, then, through some form of wearing out or degenerative process.

*Individual Causes of Death.* It has already been indicated that degenerative processes are chiefly involved in these leading causes of death. In only one, tuberculosis, is there a single causative agent specifically isolated and of communicable nature. Tuberculosis is now well understood, and there is a steady diminution in the number of deaths from it. Pneumonia, like tuberculosis, is a germ disease, but far less is known concerning it. There are a number of different germs which may cause pneumonia, and these produce diseases of varying severity and varying responses to treatment.

Of the remaining leading causes of death, accidents and other external causes are a purely artificial and man-made hazard. Cancer is still largely a mystery.

There remain the heart diseases, brain hemorrhage, and kidney disease. These represent to a large degree the breakdown of one vital system of the body, the circulatory or so-

called "cardiovascular" system. Since it is weakened in many instances from birth by poor heredity, suffers throughout its entire existence from toxins produced by the infectious diseases, and is subjected to the increasing demands which high-pressure modern living places upon it, it is small wonder that this system should break down and that it should come to occupy, as it has, a position of chief importance as related to present-day mortality. Syphilis is conspicuous among the agents responsible for these changes; it is specifically mentioned here because it is preventable, controllable, and often curable.

## Health Hazards of Infancy and Childhood

What about the possibilities of preventing the deaths of children and young people, when the saving of life means so much more than it does to postpone for a short while the death of the aged? At no other period of life does the relative importance of the various diseases change so rapidly as in childhood. From one to four years of age influenza and pneumonia, diarrhea and enteritis (intestinal disturbances), accidents, and tuberculosis head the list. Fifteen to twenty-five years later these have been replaced by tuberculosis, accidents, and diseases of the heart.

These major health problems of childhood and youth are for the most part communicable, acute conditions. Accidents are an unnecessary hazard and can be eliminated; their continuance at the present high rate is disgraceful. Tuberculosis is no longer inevitable; and colds, diarrhea, and enteritis can be reduced. In the control of the communicable diseases, past gains have been greatest and further progress may be expected.

## Causes of Illness and Disability

Just as desirable as the prolongation of life is the maintenance of health throughout life. All too frequently one's usefulness and joy of living are seriously impaired years before life is ended. The conditions and diseases chiefly responsible for disability and lowered vitality are well shown by a study by the U.S. Public Health Service of the illnesses in approximately 9,000 families in eighteen states over a period of 12 months. Altogether

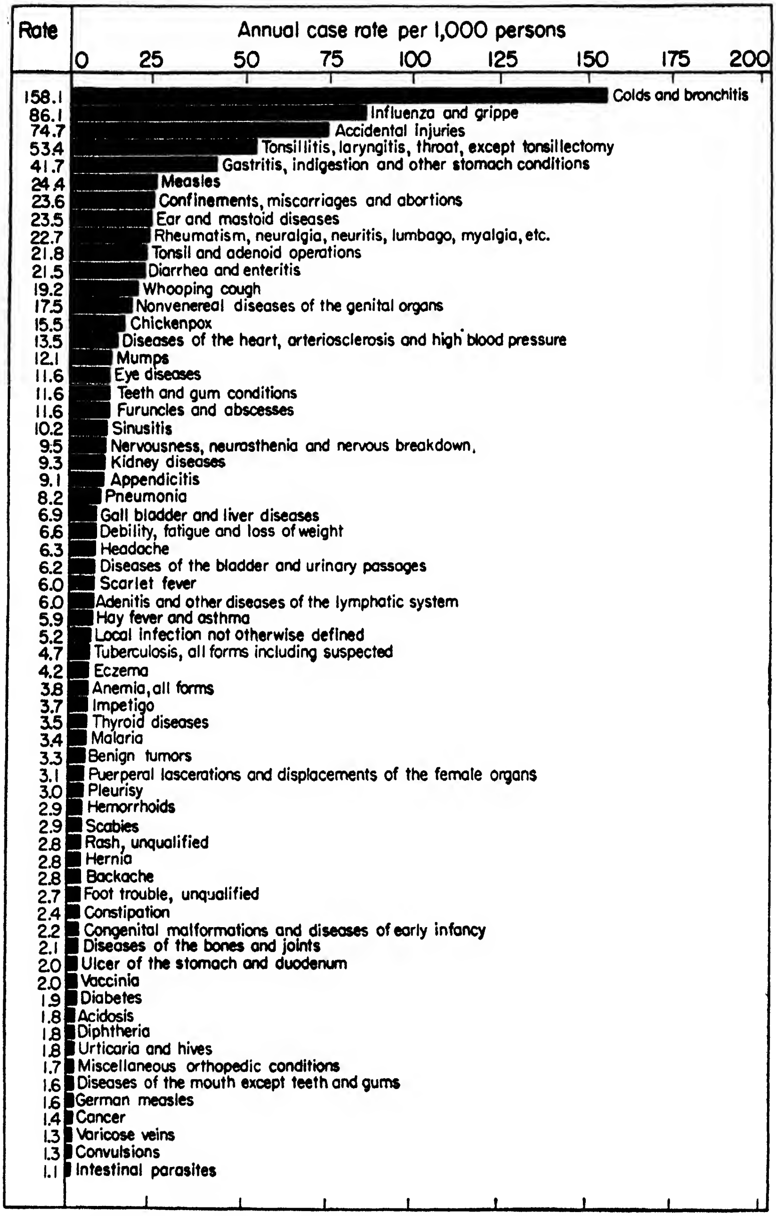


Fig. 1. Total Annual Incidence of Specific Conditions in 8,758 Surveyed Families in 18 States, 1928–1931. The Major Causes of Illness. (*S. D. Collins, "Causes of Illness in 9,000 Families. Based on Nation-wide Periodic Canvasses,* 1928–1931," *Public Health Reports, vol.* 48, *p.* 283, *March* 24, 1933.)

there were 39,185 individuals in these families, with an age distribution corresponding quite closely to that of the general population. When more than one diagnosis was reported for an illness, the one which seemed of major importance was considered the primary cause of the illness. Figure 1 shows the relative frequency of the illnesses, mild or severe, which were reported. Further tabulations which show bed confinement and loss of time from work indicate practically the same relative importance of the various illnesses as is shown in this figure.

From this as well as numerous other studies it is apparent that most of the illnesses, minor as well as disabling, from which people suffer are colds, bronchitis, influenza, tonsillitis, and other acute infections of the upper respiratory tract. Clearly these constitute the major health problem of today. The present status of our knowledge concerning these illnesses and the possibilities of reducing them will be considered in a subsequent chapter.

Accidents are a major cause of disability as well as of death. "Stomach disorders" ranks as the fifth cause of illness. Although many of the conditions included under this term are of minor importance as far as mortality is concerned, others are the first warnings of serious disease. The significance, prevention, and correction of these disorders will be considered. Of the other illnesses reported, some are caused by specific infections, others by abnormal physiological processes. Still others are the direct result of unhygienic living. It is within our power to prevent or reduce most of these.

## Lowered Vitality and Physical Efficiency

Records of death and illness are the best index we have of individual and community health, but they do not tell the entire story. There are many people who are not disabled and could not be classed as ill but whose physical efficiency is lowered and whose joy of living is seriously impaired by fatigue, nervous exhaustion, irritability, emotional frustration, defective vision, impaired hearing, or other physical or emotional handicaps. In a study of employed and unemployed workers, conducted by the Employment Research Stabilization Institute of the Uni-

versity of Minnesota, it was found that a close relation exists between the physical condition and the employment status of professional men and women, clerical workers, and skilled and unskilled laborers. These individuals either were employed or were applicants for employment and considered themselves in at least reasonably good health. In spite of this there was not only a definite relationship between employment status and physical handicaps but also a surprisingly high occurrence of correctable physical handicaps among the employed as well as the unemployed groups.

Table 1 reports the physical defects responsible for the rejection for military service of young men examined by Selective Service during the Second World War. Another report shows the physical impairments discovered in 100,000 physical examinations conducted throughout the country by the Life Extension Institute. All these individuals had previously passed examinations for life insurance; hence, one would expect them to be above average in health. In spite of this, more than one-quarter of them had uncorrected defective vision, and one-eighth had defective hearing. Many had infected tonsils, heavy dentistry (that is, extensive dental repair, crowns, etc.), decayed teeth, septic roots, and pyorrhea, all of which suggest probable foci of infection to menace future health. The reporting of constipation by one-third of those examined, of acid stomach or gastric disturbances by one-sixth, and of the habitual use of laxatives by one-fourth is evidence that the health and physical efficiency of a considerable proportion of individuals are impaired by faulty nutritional hygiene. Nervousness and insomnia were reported by about 8 per cent of the group. Many of these conditions could have been prevented, and many could still be corrected, by adequate medical care, proper diets, and reasonably intelligent living.

## Physical Fitness[2]

The years of youth are truly golden years—golden not only in an abundance of health and vitality, but also in opportunities,

[2] Adapted in part from "Health and Physical Fitness," by Morris Fishbein, *Hygeia*, p. 815, November, 1946.

all too frequently missed, to build the foundation for a healthful, happy, and successful life for the years ahead. Habits of diet, of exercise, of rest, of the use of alcohol and tobacco, of emotional stability, formed in youth, usually persist and are major factors in determining one's future pattern of life and of health.

The great victories which were won in the Second World War by American troops all over the world were not won by men who were physical weaklings. The American soldier proved himself to be a competent fighter. He represented a selection of the best physical specimens of our nation, developed to fighting efficiency by the training program of the armed forces.

On the other hand, there are evidences of physical deficiencies in our population which are capable of prevention and in some instances of correction. Many of the 4,000,000 men who were rejected for military service during the Second World War could have been made physically fit had the advantages which medical science and physical education have to offer been made available to them. Many were pampered and soft and in need of physical conditioning. It is folly for a nation as wealthy and efficient as ours to fail in its utilization of what medical science has to offer for developing a nation that is physically fit.

Fitness is a state of mind and body in which the tissues have power and efficiency. A program of physical fitness includes the teaching of good personal hygiene. This in turn means enough sleep, proper nutrition, controlled exercise and rest periods, mental hygiene, and recreation. The person who is fit has a great deal of what sports writers call "bounce." His mind and body are resilient and elastic. He recovers promptly from minor bruises to his tissues or his personality.

Improvement of physical fitness must begin even before birth, with proper prenatal care. It must continue through infancy with an immunization program that will prevent many of the infectious diseases of childhood and their crippling complications. It must go on through the nursery and kindergarten where sound habits of nutrition begin to be established. It must carry through grade school, high school, and college, where sound instruction in health habits and physical activities, including

competitive sports, should be integrated in the curriculum. Finally, when the boy or girl has left school, there must be continuing participation in healthful living, sports, and recreational pastimes to maintain the physical fitness that the schools have established.

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## Chapter II

# OUR MAJOR HEALTH PROBLEMS

IN PLANNING a campaign, the military strategist surveys the entire field of action, appraises its strong points and its weaknesses, and then concentrates his efforts where the dangers seem greatest and the possibilities of success brightest. Figure 1 and Tables 1 and 2 give us a composite view of the major health problems with which we are faced. Let us examine these and then direct our attention to those conditions which offer the greatest hope of improvement.

## Accidents[1]

The importance of accidents as a preventable cause of death and disability demands that they be given first place in the consideration of our specific health problems. In 1948 one person in the United States was injured accidentally every 3½ seconds —10,300,000 persons in all. Of these, 330,000 were permanently disabled and an accidental death occurred approximately every 5 minutes. The total economic loss from these accidents is estimated as $7,200,000,000. The 98,000 deaths in this one year, exceeded the number of fatalities from wounds in the U.S. Army in any of the wars in which this country has engaged except for

[1] Figures on accidents are primarily from reports of the National Safety Council, Chicago, Ill.

the Civil War and the Second World War. During the Revolutionary War, 4,044 American soldiers were killed or died from wounds; during the War of 1812, 1,956; during the Mexican War, 1,549; during the Civil War, 110,070 among the Northern armies and 74,524 among the Southern forces; during the Spanish-American War, 1,704; and during the First World War, 50,510. In the Second World War, which lasted for almost four years, 325,000 combat deaths occurred among all our armed forces. During the invasion of France the number of killed and wounded was very large. Yet, the total casualties during the first 10 days of the Normandy invasion were less than the number of casualties from automobile accidents for an average 10-day period in 1948.

*Home Accidents.* Accidents are of major importance at all ages but, relatively at least, they take their greatest toll of life in childhood, ranking as the first or second cause of death in every age group from birth to 25 years of age. Most of these accidents to children occur in or about the home and are due to carelessness or poor housekeeping. In 1948, 34,500 people lost their lives in home accidents, 140,000 were permanently disabled, and 5,060,000 were less seriously injured. Approximately 50 per cent of these fatalities were the result of falls; 16 per cent, of burns; 3 per cent, of gas; 4 per cent, of poisoning; and 27 per cent, of various other causes.

Material reduction of these various types of home accidents can be accomplished if people will take the following precautions:

1. Provide adequate lighting and hand rails for stairways and use stepladders for reaching objects beyond their grasp.

2. Avoid the storage of objects on stairways and the accumulation of ice and snow on porches and steps.

3. Guard against slippery floors, loose rugs, and toys on the floor.

4. Be certain that electric cords are kept in good condition and that electric fans and heaters are adequately protected.

5. Avoid the use of inflammable cleaning fluids indoors.

6. Keep knives, garden tools, broken glass, boiling water, open fires, matches, and medicines out of the reach of children.

7. Be certain that poisons are kept in distinctly marked containers.
8. Be careful of doors that stand ajar and blind swinging doors.
9. Guard against gas stoves or plates with rubber or leaky tubing.
10. Avoid smoking in bed and starting automobiles in the garage with the doors closed.

It seems almost trite to enumerate such commonplace and homely precautions, but carelessness in regard to them was responsible for most of the 34,500 fatal and approximately 5 million nonfatal home accidents last year.

*Industrial Accidents.* Industrial or occupational accidents were responsible for 16,500 deaths in 1948. This is far too many, but it represents a vast improvement over the 35,000 deaths from this cause in 1913. The National Safety Council has calculated that from 1913 to 1936 there were 265,000 fewer accidental deaths and 25 million fewer disabling injuries than would have occurred had the 1913 rate continued. In 1907, 4,500 railroad employees and 610 passengers were killed in accidents, but by 1948 this total had been reduced to 425 employees and 35 passengers.

Such marked reduction in occupational accidents is the result not of chance but of an organized effort on the part of most of the larger and some of the smaller industries. One might add that in many states the passage of industrial compensation laws has given effective impetus to the prevention of industrial accidents. Many companies and corporations have made their plants such safe places to work, and have instructed their employees so well in safety measures, that their accident records are almost perfect. Unfortunately, there are still thousands of small and medium-sized plants all over the country that make little or no effort to prevent accidents to their employees and so as a group have disgraceful accident rates.

*Automobile Accidents.* The development of the modern automobile has introduced the most serious accident problem of all time; in fact, the increase in automobile accidents has more

than offset the gain made by the reduction of industrial accidents. During 1948, 32,000 deaths were due to traffic accidents, 90,000 persons were permanently disabled, and 1,000,000 were temporarily injured.

The importance of this problem can be better comprehended when we realize that, if the present rate of slaughter continues, one out of every 25 persons in the United States will be injured or killed in a motor vehicle accident within the next five years. An even more startling prophecy is that unless some drastic means of combating traffic accidents is instituted, two out of every three children under 10 years of age now living will be injured in motor vehicle accidents in their lifetime.

An analysis of 533,000 reported motor accidents showed that 107,000 accidents were due to excessive speed, 138,000 to drivers not having the right of way, 86,000 to driving on the wrong side of the road, and 5,000 to driving completely off the road. Some of these accidents are due to physical handicaps or impairments. These, of course, can and should be discovered before drivers' licenses are issued. About 1 per cent was due to faulty mechanism of the car and some to the condition of the highways, but for the vast majority of automobile accidents the driver alone is responsible. Accident rates for drivers 16 to 20 years of age are five times as high as for drivers 45 to 50 years old.

Passenger-miles flown in the United States during 1948 are reported to have had a passenger death rate of 1.4 per 100,000,000 miles, about half the death rate from automobile traffic accidents computed on a passenger-mileage basis.

That many automobile accidents can be prevented by community action is evidenced by the following facts:

> In one group of cities, each with a million or more population, one city has a traffic accident record of 16.8 fatalities per 100,000 population, while another city in the same group has a loss ratio of 37. In another group of cities each with a population of 250,000 to 500,000 one city has a record of 7.8 fatalities per 100,000 population, and another has a loss ratio of 32. Or again, in a group of cities, each with a population of 100,000 to 250,000, one city has a record of 6.1 fatalities per 100,000 population, while another has a loss ratio of 46.
>
> Must we admit, then, that we do not sufficiently *want* to save lives? The real trouble is that old weakness of the human creature. . . . He is not only

ignorant and stupid, but a fatalist and entirely reckless of accidents. Sometimes he seems to grow quite mad when he gets into the seat of a powerful machine capable of doing 100 miles an hour. He is lawless, too, when the public welfare interferes with his personal desires. We are extremely fortunate, therefore, that our accident records of highway disasters show that, after all, only a small percentage of all motor vehicle drivers cause the very great majority of all the accidents. There is in traffic deaths and injuries the same "accident prone" type of person that we have found in industry and in transportation.[1a]

The intimate gruesome spectacle of these statistics of automobile accidents is portrayed in an unusually realistic manner by J. C. Furnas in a special article entitled "—And Sudden Death" in *The Reader's Digest*, August, 1935, from which the editors have graciously granted permission to quote as follows:

Publicizing the total of motoring injuries—almost a million last year, with 36,000 deaths—never gets to first base in jarring the motorist into a realization of the appalling risks of motoring. He does not translate dry statistics into a reality of blood and agony. . . .

Figures exclude the pain and horror of savage mutilation—which means they leave out the point. They need to be brought closer home. A passing look at a bad smash or the news that a fellow you had lunch with last week is in a hospital with a broken back will make any driver but a born fool slow down at least temporarily. But what is needed is a vivid and sustained realization that every time you step on the throttle, death gets in beside you, hopefully waiting for his chance. That single horrible accident you may have witnessed is no isolated horror. That sort of thing happens every hour of the day, everywhere in the United States. . . .

An enterprising judge now and again sentences reckless drivers to tour the accident end of a city morgue. But even a mangled body on a slab, waxily portraying the consequences of bad motoring judgment, isn't a patch on the scene of the accident itself. No artist working on a safety poster would dare depict that in full detail.

That picture would have to include motion-picture and sound effects, too—the flopping, pointless efforts of the injured to stand up; the queer, grunting noises; the steady, panting groaning of a human being with pain creeping up on him as the shock wears off. It should portray the slack expression on the face of a man, drugged with shock, staring at the S-twist in his broken leg, the insane crumpled effect of a child's body after its bones are crushed inward, a realistic portrait of an hysterical woman with her screaming mouth opening

[1a] Rohweder, A. V., "What Shall We Do about Accidents?" address delivered at the Conference of State and Provincial Health Authorities of North America, Washington, D.C., 1937.

a hole in the bloody drip that fills her eyes and runs off her chin. Minor details would include the raw ends of bones protruding through flesh in compound fractures, and the dark red, oozing surfaces where clothes and skin were flayed off at once. . . .

The automobile is treacherous. It is tragically difficult to realize that it can become the deadliest missile. As enthusiasts tell you, it makes 65 feel like nothing at all. But 65 an hour is 100 feet a second, a speed which puts a viciously unjustified responsibility on brakes and human reflexes, and can instantly turn this docile luxury into a mad bull elephant.

It's hard to find a surviving accident victim who can bear to talk. After you come to, the gnawing, searing pain throughout your body is accounted for by learning that you have both collarbones smashed, both shoulder blades splintered, your right arm broken in three places and three ribs cracked, with every chance of bad internal ruptures. But the pain can't distract you, as the shock begins to wear off, from realizing that you are probably on your way out. You can't forget that, not even when they shift you from the ground to the stretcher and your broken ribs bite into your lungs and the sharp ends of your collarbones slide over to stab deep into each side of your screaming throat. When you've stopped screaming, it all comes back—you're dying and you hate yourself for it. That isn't fiction either. It's what it actually feels like to be one of that 36,000.

And every time you pass on a blind curve, every time you hit it up on a slippery road, every time you step on it harder than your reflexes will safely take, every time you drive with your reactions slowed down by a drink or two, every time you follow the man ahead too closely, you're gambling a few seconds against this kind of blood and agony and sudden death.

Take a look at yourself as the man in the white jacket shakes his head over you, tells the boys with the stretcher not to bother and turns away to somebody else who isn't quite dead yet. And then take it easy.

## Tuberculosis

Tuberculosis, long thought inevitable and called the "captain of the men of death," is classed today as a preventable disease, amenable to epidemiologic control methods. It has been pointed out that, of the seven leading causes of death, the tuberculosis rate is falling most rapidly. When it is recalled that for many years tuberculosis was the leading cause of death, this drop to approximately one-fourth the rate of the beginning of this century becomes impressive. The change came in response to a definite plan of attack on the disease and an extensive educational campaign for its prevention.

A few years ago we believed and taught that by the age of twenty practically everyone was infected with tuberculosis. Today we know that this is not true; for as we examine college and university students by the thousands, we find that approximately three out of four have had no infection with tuberculosis whatsoever. By means of these examinations we also determine whether or not those who have been infected have active disease. If they have, they can be treated at a time when their chances of recovery are of the very best and the danger of transmitting the disease to others negligible.

The cause of tuberculosis is a specific germ called the "tubercle bacillus," the bovine and the human strains of which may infect man. Some years ago milk was a serious mode of transmission of the bovine strain of this bacillus to children, but with the widespread adoption of the pasteurization of milk and the effective program for the eradication of tuberculosis among cattle, bovine infection of man has become rare.

In the control of human tuberculosis, unfortunately, we have made much less progress than the veterinarians have made in the control of the disease among animals. Yet all of the scientific information necessary eventually to eradicate this disease is available. All that we need to do is to apply it.

We know, for example, that a person who becomes infected has taken into his body, usually through inhalation, living tubercle bacilli and that these tubercle bacilli have been discharged relatively recently, and usually by means of expectoration, from the body of someone else. Hence, if we can discover the individuals who are disseminating tubercle bacilli and can isolate or treat them so that they will be no longer infectious, the chain of continuing infection will be broken.

That raises the question as to how the disseminators of infection can be identified. This can be accomplished in two ways. One is by the widespread use of the tuberculin test to determine which individuals have been infected. The other is by x-ray examination of the chest. Routine x-rays are particularly valuable in special groups such as hospital and clinic patients, military recruits, college students, and employee groups. Experi-

ments with mass x-rays of whole communities, including one city of 500,000 population, have revealed undiagnosed cases in sufficient numbers to justify the effort and the expense involved.

The tuberculin test is usually performed by injecting into the skin of the forearm a minute amount of tuberculin; this is called the "Mantoux test." If the area of injection becomes red, it indicates that the person has been infected at some time or other with tubercle bacilli. This infection may be active at the time or it may have occurred long ago and be completely healed; in fact, it may have been overcome without ever gaining any real foothold in the body. The Mantoux test does not distinguish between an active, a quiescent, and a healed infection.

The next step obviously is to have a more thorough examination of those individuals who react to the tuberculin test. This means, first of all, an x-ray of the chest and then a careful appraisal of x-ray findings and physical condition by a physician. Most of those who react to tuberculin show no evidence of active tuberculosis; some show findings which make frequent reexamination desirable; and a few are found to have definitely active disease. These are either infectious or potentially infectious and should be treated as such.

Most colleges and universities now include tuberculin tests and chest x-rays of students as a part of their routine entrance physical examinations. This procedure is discovering each year in the colleges of this country some students who would have been active sources of infection to others if these tests had not been performed. Examples of what can happen if students with active tuberculosis live in close association with other students are contained in the following reports of actual occurrences:

Some years ago a senior medical student reported to the University of Minnesota Health Service with typical symptoms of tuberculosis: elevation of temperature, cough, sputum, and loss of weight and strength. A few months before, he had been in intimate contact with a brother who had died of tuberculosis. Examination revealed extensive tuberculosis involving the left lung. This progressed with such rapidity that he died a little over three weeks after reporting to the Health Service. His

sputum contained large numbers of tubercle bacilli and before death tubercle bacilli were found in the blood stream. This student had been living at a fraternity house. During the next year, six of his fraternity brothers who had been in intimate contact with him fell ill from pulmonary tuberculosis.

Dr. Stiehm of the University of Wisconsin reported the case of a girl who in her senior year lived in a sorority house. For three months before she consulted a physician she had had a persistent cough. Examination revealed evidence of far advanced pulmonary tuberculosis and her sputum contained large numbers of tubercle bacilli. Of her fifteen sorority sisters who reported for the tuberculin test, eleven had previously been found negative to the test on entrance examinations or in high school. All these girls after exposure to their sorority sister reacted positively to the test. Of the remaining four girls who had not previously been tested, three now reacted positively to the test. The only one who was negative had lived in the sorority house only two weeks. Dr. Stiehm later found that one of the girls who had been infected by her sorority sister had developed active tuberculosis and another had suffered a spontaneous collapse of the lung.

Nine students of the University of North Dakota died from tuberculosis within ten years after they had lived in a fraternity house with another student who had an active case of this disease.

The tuberculin test is a valuable procedure to determine whether or not an individual has been infected with tuberculosis and as such should be a part of every physical examination. If the original test indicates that the person has not been infected, the test should be repeated periodically, preferably each year, if the person seems well, and whenever the individual exhibits any symptoms which suggest the possibility of tuberculous infection. If the Mantoux test is positive, indicating past infection, but the x-ray and physical examination show no evidence of active disease, the test does not need to be repeated because in all probability it will continue to be positive, but an x-ray examination of the chest should be made periodically to see if there is evidence of the infection becoming active. One might

ask: Why not wait until symptoms suggestive of tuberculosis develop? The answer is that signs of beginning activity of chronic tuberculous infection of the lungs may be seen in an x-ray plate two and a half years, on the average, before symptoms appear, and by the time that recognizable symptoms bring the patient to the physician 85 per cent of cases are moderately or far advanced. Since the results of treatment of tuberculosis depend largely upon the stage at which treatment is begun, these months of delay may be the difference between recovery and death in determining the final outcome of the disease.

The great reduction which has occurred in tuberculosis and the demonstrated effectiveness of control measures justify the hope that in another generation or two tuberculosis may become a rare disease. Persons who have been infected can know their exact condition and can obtain treatment if necessary. Beds in carefully controlled institutions are now available for actively contagious cases. The tremendous hazard of the open, contagious case of tuberculosis in the community is being gradually diminished. When all patients with active disease are treated and those who are a danger to others are isolated, our children can grow up without even that first infection which seemed unavoidable a generation ago.

The high infection rate of tuberculosis among young women has been variously attributed to dieting, to the light clothing that girls wear, and to natural susceptibility at this age. The importance of any of these factors is debatable, but it is certain that every boy or girl who develops tuberculosis has been exposed to some person or some animal with the disease. And when a child becomes infected, this person is almost certainly within the family—a parent, possibly, or a grand parent with "chronic bronchitis," or an older brother or sister, or a nursemaid or cook. A study in Cattaraugus County, New York, shows that the risk of death from tuberculosis is nine times greater for offspring in the tuberculous families than for the general population. How long will it be before we protect our children from tuberculosis by being certain that the adults with whom they have intimate contact are not exposing them to infection?

Approximately twenty-five years ago, scientists at the Pasteur Institute in Paris produced a vaccine against tuberculosis. This vaccine, which is called "BCG," consists of a strain of tuberculosis germs from cattle. The germs have been grown in the laboratory for so long that they are no longer able to produce disease. They do, however, produce a mild harmless infection which results in the increase in the person's resistance against tuberculosis. In this country BCG vaccine is being used and the results carefully observed in persons who are closely and continuously exposed to patients with active tuberculosis. It is hoped that the encouraging results with this vaccine, particularly in increasing the resistance of children whose parents have active tuberculosis, will be confirmed by the further studies now in progress.

Yes, tuberculosis can be prevented. The measures for its eradication are in our hands. Yet, each year, with its 50,000 deaths in this country, tuberculosis kills more persons between fifteen and forty-five years of age than any other disease. The slow onset of tuberculosis frequently hinders its early diagnosis, arrested cases may again become open, and the public is thus still exposed to an unnecessarily large risk of infection. The war against tuberculosis is by no means over!

## The Common Cold

Colds and their complications are responsible for more illness, disability, and loss of time from employment than all other diseases taken together. Colds themselves are never fatal and rarely serious. Their great danger lies in their complications, of which pneumonia, ear and sinus infections, and mastoid disease are the most common. The "common cold" is not a clear-cut disease entity like diphtheria, smallpox, or scarlet fever but covers various disorders of the nose, throat, and even the lower respiratory tract.

*The Cause of Colds.* Some colds are infections, caused either by a specific cold virus or by certain bacteria; while others are due primarily to disturbances of the circulatory and temperature-control mechanisms of the body. The latter, which develop as the result of chilling, drafts, alcohol, or allergies, may

become secondarily infected by germs which happen to be present in the nose and throat.

*Prevention of Colds.* First among the means of prevention is *the avoidance of infection.* The colds which are caused by germs, whether these be viruses or bacteria, are communicated from person to person. Sneezing, coughing, and even speaking propel these germs into the air. The hands of one who has a cold are certain to be grossly contaminated, and infective material is transmitted from his hands to the hands of others which he shakes and to the doorknobs, handrails, and other objects which he touches. Glasses, forks, and spoons used in hotels, restaurants, and soda fountains, unless sterilized with chlorine or steam, (which is exceedingly rare), are literally covered with germs from the mouths of the persons who have used them previously.

Under the conditions of modern life it is obviously impossible to avoid exposure to colds. The best that we can hope for is to reduce the degree of exposure, thereby correspondingly reducing the probability of infection. This can be accomplished by keeping one's distance from individuals who have colds; by absolutely prohibiting persons who have colds from any association with infants; by thorough washing of the hands before meals and after contact with objects likely to contain infective material; by keeping the hands away from the nose and mouth; by the routine sterilization of dishes and silverware; and by the use of individual drinking glasses even within the family.

Since *chilling* is a factor in the production of colds, those of us who are leading relatively sedentary, indoor lives will have less colds if we avoid drafts and other kinds of exposure and chilling. Adequate and proper clothing and shoes to keep the body warm and the feet warm and dry are important. This is especially true with children. Our places of work and our residences should be warm and free from drafts, but not overheated.

The ventilation of sleeping quarters should be regulated in accordance with outside atmospheric conditions, keeping in mind the fact that drafts are undesirable and that sleep is most restful in an atmosphere which is cool, rather than warm or cold.

Many *dietary measures* are recommended for the prevention of colds but none of these is based upon scientific evidence or established fact. For the maintenance of health a complete, adequate, and balanced diet is necessary, but beyond this no special diet or vitamins have been demonstrated to be of value for either the prevention or the cure of colds.

*Cold vaccines*—not "cold serums," as they are commonly called, for there is no serum for colds—have been more or less widely utilized for many years in the hope of preventing colds. These vaccines contain various mixtures of the bacteria most commonly found in the nose and throat of persons with colds.

For a number of years carefully controlled studies concerning the value of various measures advocated for the prevention and treatment of colds have been carried on by the Students' Health Service of the University of Minnesota. In these studies two bacterial vaccines were included. One of these was administered hypodermically and the other by mouth. The results indicate no benefit from the oral vaccine and very little benefit from the vaccine administered by hypodermic injection.

*Nasal Hygiene.* Nasal sprays, nose drops, gargles, and antiseptics are extensively advertised during the winter months for the prevention of colds. Millions of dollars' worth of such materials are sold in this country each year, in spite of the fact that there is no real evidence that any of these preparations, oils, or antiseptics are of value for the prevention of colds. Furthermore, one cannot even be certain that the use of such preparations is harmless.

Mouthwashes, gargles, and antiseptics may destroy germs in test tubes if given sufficient time but none of them acts instantaneously nor are they effective in the weak solutions which can be tolerated by the membranes of the nose and throat. Furthermore, only a very small proportion of these membranes can possibly be reached by sprays and gargles.

Briefly summarized, the only conclusions we can draw on the basis of present scientific knowledge concerning the prevention of colds are the following:

1. There is no measure that is specific or uniformly effective for the prevention of the common cold.

2. General measures of value in increasing resistance are adequate rest and sleep; exercise and baths, to keep the circulation in good tone; a diet that is adequate and well balanced, moderate in quantity, and containing liberal amounts of fruits and vegetables.

3. Important among the more definite preventive measures are adequate clothing and proper ventilation so as to avoid chilling, excessive temperatures, and drafts; the avoidance of exposure, both direct and indirect, to persons who have colds; the recognition, diagnosis, and correction of allergic conditions; and the removal of obstructing or definitely diseased tonsils and adenoids.

4. Vitamin supplements to adequate, well-balanced diets have not been shown to increase resistance to colds. However, if diets are limited the use of dietary supplements may be advisable for their general health value.

5. Vaccines have not been shown by critical studies to be of sufficient value to justify their widespread or indiscriminate use, although they may be helpful in occasional, carefully selected individual cases.

*Treatment of Colds.* First, as to *bed rest:* "Go to bed when you have a cold and stay there until you are well" is good advice. Its value lies in protecting others from exposure, in increasing general resistance, and in keeping the body warm. Bed rest during the acute stages of colds, supplemented by such other treatment as is indicated, would doubtless diminish their severity, limit their spread, and reduce the frequency of complications. Unfortunately, like most good advice, this is rarely followed. Most people just will not stay in bed unless they feel ill.

*Hot baths* for the treatment of colds may consist of hot water, hot air, or steam. The effect of these baths is to dilate the blood vessels of the skin and to increase blood flow through them. As a result of this, nasal congestion and stuffiness are reduced. Probably everyone has experienced the relief of nasal stuffiness which frequently follows a hot bath.

Similar effects may be obtained with *massage* or other forms

of *physiotherapy*, with hot or cold compresses, mustard plasters, and certain medicated ointments. If such treatments are followed by rest in bed with sufficient covers to prevent cooling, the effect is prolonged and the possibility of their being of more than temporary benefit is increased.

*Exercise* is frequently utilized by athletes for the treatment of colds. They describe it as "sweating out" a cold. What they experience is relief of nasal stuffiness, and possibly of discharge, as a result of the exercise. This occurs, as with hot baths, because of the increased flow of blood to the muscles and the skin. Such relief is only temporary, but occasionally it does seem to prevent further progress of the cold. Usually, however, the symptoms recur when the body gets chilled, and then the cold may become even more severe than before.

*Large quantities of liquids* in the form of water, lemonade, orange juice, or other drinks have long been considered a valuable aid in the treatment of colds. The purpose of these is to increase excretion, thereby, presumably, aiding in the elimination of the supposedly toxic products produced by the infection. This sounds plausible, but unfortunately there is no evidence that it actually occurs. So we are forced to conclude that the practice of forcing fluids for colds is based upon assumption rather than upon evidence of its value.

*Medicinal Treatment of Colds.* Many millions of dollars are spent in this country each year for medicinal preparations for the treatment of colds. The best of these, but only a small fraction of the total, are purchased on physicians' prescriptions. The rest pay for the advertising, the radio programs, and the enormous profits of the manufacturers of relatively worthless "cold remedies."

Colds are of such variable severity and duration that individual experience is of very little significance in judging the value of any preparation for either their prevention or their treatment. For this reason carefully controlled experiments to determine the value of various medications for the treatment of colds were conducted over a period of approximately five years by the Students' Health Service of the University of Minnesota.

The procedure followed in these studies was such as to prevent prejudice for or against any particular preparation.

Briefly summarized these studies showed that

1. The medications of definite value for the treatment of colds all contained derivatives of opium.

2. The best results were obtained with a combination of codeine and papaverine.[2]

3. Advertised cold remedies gave results little if any better than were obtained with sugar tablets.

4. "Nose drops" are more likely to be deleterious than beneficial in an acute cold.

Penicillin and the sulfonamides give such dramatic results in so many infections that they have come to be known as the "wonder drugs." It is natural, therefore, that they should be tried for the treatment of colds. The results, however, have been disappointing except for the treatment of some of the complications which follow certain colds. Furthermore, these drugs are not without danger and so should be used only on the advice and prescription of a physician.

Very recently a number of drugs known as the antihistamines have been extensively advertised for the prevention and treatment of colds. As yet, however, no critical and convincing studies have been repoted concerning their value.

*The Commercial Aspect of Colds.* The sale of preparations for the prevention and treatment of colds has become big business, so big in fact that *Fortune Magazine*[3] devoted a major article to it a few years ago. Concerning this business *Fortune* says: "The least of the cold soother's worries is his formula. What goes into his pills or syrups or salves is distinctly a secondary consideration. How to sell his concoction is what chiefly worries the aspiring manufacturer of cold remedies. He is in a business where competitors are many and scruples are few."

Such information should serve as a warning in regard to the claims made by newspaper, billboard, and radio advertisers; but the customer needs also to beware of the cold remedies which the prescribing druggist recommends.

[2] This preparation is available in most drugstores on a physician's prescription.

[3] "The Cold Business," *Fortune Magazine*, vol. 6, p. 26, October, 1932.

Several years ago an investigator, feeling that he was coming down with a cold, visited seven different drug stores in Chicago and asked for remedies for his cold. With one exception, he obtained in each drug store three items. The bill for the three items averaged $2. None of these remedies duplicated others. Some were entirely useless, some might have given temporary symptomatic relief; others were prescriptions which were apparently pet hobbies of the druggists "consulted." The seventh druggist suggested that the investigator return to his home, go to bed and call a physician; adding, that the undertaker across the street was exceedingly busy during this particular period.[4]

The best pharmacists do not prescribe for their patients; but if anyone believes seriously that counter prescribing is not a standard trade practice in drugstores, his attention should be called to an article in the November, 1937, issue of the magazine called the *American Druggist.* The title of this article is "A Billion Dollar Sneeze." The article presents many correct facts about colds. Then tucked away at the end, next to advertisements of Adex Tablets and Smith Brothers' Cough Drops, are five steps to cold prevention by means of which the druggist is assured his sales will increase. The first step is vitamins. "Science," according to this magazine, has proved "that the vitamin A and D content of fish-liver oils helps in the treatment of colds." This is opportunity number one. The second step is a laxative! Concerning this the magazine states, "The laxative treatment you recommend can be a 10¢ item or a $1.25 sale." The third step has to do with sales possibilities in nose drops, jellies, sprays, and inhalants; and the fourth step cashes in on "any one of a number of mouth washes and gargles." In the fifth step the customer gets over on the alkaline side with milk of magnesia and antacid powders and tablets. And the climax:

Clerks should be taught the practical advantage of solicitous inquiries about the customer's symptoms. Muscular pains, sore throat, headache, clogged nasal passages, chills, chest pains, and coughs *each* may be the basis for the sale of a product over and above what the customer came in to buy. . Get your share of this billion dollar business . . . and you will make money out of sneezes and sniffles.[5]

[4] "Norwich Capitalizes on Colds," *Journal of the American Medical Association,* vol. 116, p. 56, January 4, 1941.

[5] "Why Druggists Prescribe," *Journal of the American Medical Association,* vol. 110, p. 290, January 22, 1938.

## Influenza

"Influenza" and "grippe" are terms used to designate acute infections of the respiratory tract in which constitutional symptoms are more pronounced than in the common cold. Although coryza frequently accompanies influenza and grippe, the latter conditions are characterized more particularly by headache, sudden onset, backache, fever, chills, prostration, sore throat, and cough. The fatality rate from influenza is low, most patients recovering in three to four days, but cough and weakness may persist for some time.

Just what is the relationship or the difference between grippe and influenza is not clear. The symptoms and physical findings are similar. In general, however, the term "grippe" is usually used to designate the relatively mild infections which occur with greater or less frequency almost every winter, while the term "influenza" is used for the more severe infections which occasionally occur in epidemic form.

Influenza, or grippe, is an acute infectious disease. At different times various germs have been considered its cause. Recent work of Andrewes, Laidlaw, and Smith in England and Francis in this country have proved the cause to be a filtrable virus. These workers, using filtered nasal secretions from patients with influenza, have succeeded in infecting ferrets, mice, and human volunteers. This is very important, but of even more immediate practical value is the vaccine which Francis has developed for the prevention of influenza. This vaccine was widely used during the Second World War. In general it seems to reduce the occurrence of influenza among vaccinated persons to about one-third the rate among the unvaccinated. Unfortunately, however, the general usefulness of this vaccine is limited by the appearance of new strains of the virus against which the vaccine is ineffective.

Lacking a completely effective preventive vaccine, we must also utilize general measures to combat this disease. The virus of influenza is highly infective and is transmitted from person to person by means of discharges from the nose and mouth.

Measures to reduce contact with infected persons should be observed, despite the fact that they are not completely effective.

The great danger from influenza is not the disease itself but the pneumonia which so frequently complicates it. This may develop in spite of all precautions, but it is most frequent among persons who remain up and about while ill. Consequently, the most valuable advice which can be given to patients with influenza is "go to bed when you have any fever and remain there until thoroughly recovered." Other measures are helpful but should be prescribed by a physician in accordance with the needs of the individual patients.

## Pneumonia

Pneumonia can hardly be considered a single disease, for it may be caused by various germs and it acts differently at different periods of life. Although always serious, pneumonia is rarely fatal to persons in the prime of life. In infancy and old age pneumonia is largely a terminal process; that is, it is the actual method by which death comes to a large number of individuals previously weakened by infectious disease, by injury, or by the lowered vitality characteristic of extreme youth or extreme age.

Pneumonia is an inflammatory process of the lungs which causes a portion of one or both lungs to be filled solidly with serum, red blood cells, and leucocytes. The cause of pneumonia is a germ—most commonly the pneumococcus, the streptococcus, or a virus, although the tubercle bacillus, the staphylococcus, etc., may occasionally be responsible.

Pneumonias caused by the streptococcus are usually secondary to some other disease, such as measles, whooping cough, or influenza, and produce small areas of inflammation scattered throughout the lungs. These areas of infection begin around small branches of the bronchi and are frequently spoken of as bronchopneumonia. The prevention of such pneumonias depends primarily upon the prevention or, failing that, the early and adequate care of the primary disease. The experience during the First World War showed that the pneumonia rate with influenza

was much higher among soldiers in the field than among those who were promptly hospitalized. Children with measles or whooping cough should be carefully protected from all contact with persons who have colds and from conditions which will tend to lower their resistance. There is no specific serum treatment for streptococcic pneumonia, but the new antibiotic drugs give excellent results in most cases. All pneumonia patients should have adequate medical and nursing care.

Pneumonias caused by the pneumococcus, of which there are a considerable number of different types, frequently involve one or two lobes of the lungs at a time and so are called "lobar pneumonias." Bronchopneumonias, however, also may be caused by the pneumococcus. These pneumococcic pneumonias are considered as primary pneumonias, although patients usually report having had a cold before the onset of the pneumonia. It seems that, even with virulent pneumococci present in the nose and throat, some temporary lowering of the resistance from fatigue, alcohol, chilling, malnutrition, or a cold is frequently necessary for an actual pneumonia to develop.

Pneumococci are disseminated with the nose and throat discharges of patients and of healthy carriers. In fact, during seasons of pneumonia prevalence there are many more healthy persons carrying pneumococci in their noses and throats than there are actual cases of the disease.

One attack of pneumonia does not confer a permanent immunity against subsequent attacks. On the contrary, there seems to be an increased susceptibility to the disease after one attack. Vaccines have been tried at various times for the prevention of pneumonia, but no definite value for them has as yet been established.

In the treatment of certain types of pneumococcic pneumonia, definite progress was made through the development of a specific serum treatment. If given early in the disease, this serum reduces the death rates of the particular type of pneumonia for which it is applicable by 20 to 30 per cent. Still better, however, are the results obtained with the sulfonamides, penicillin, and aureomycin. In large groups of patients these new drugs have

reduced the fatality rate from pneumonia by as much as 80 to 90 per cent.

For the prevention of pneumonia one can suggest only general measures for the avoidance of anything which tends to reduce vitality, such as dissipation, loss of sleep, fatigue, overwork, worry, poor or insufficient food, alcohol, colds, and excesses of all kinds. More care than is usual should be given to acute minor respiratory infections such as colds, influenza, bronchitis, and sore throats. Persons with these infections should be isolated in bed during the acute stage and stay there at least as long as there is fever. Pneumonia should be considered a communicable disease and patients with pneumonia should be isolated in order to reduce the spread of infection to others.

## Cancer

Cancer as a cause of death has a natural tendency to increase as more people reach the cancer age, but so rapidly have cancer deaths mounted that it seems that there may be an absolute as well as a relative increase in its rate. This increase, however, may be checked to a certain extent as more and more people present themselves for medical care at the first onset of symptoms such as the following which are, or could be, due to cancer:

1. A sore that does not heal normally, particularly about the tongue, mouth, or lips.
2. A lump or thickening, especially in the breast, lips, or tongue.
3. Bloody discharge from the nipple or abnormal bleeding from any of the body openings.
4. Progressive change in the size or color of a mole or wart.
5. Persistent indigestion.
6. Persistent hoarseness, unexplained cough, or difficulty in swallowing.
7. Any pronounced change in usual bowel habits.

Improvements in cancer treatment are giving encouraging results. Surgery and, in carefully selected cases, x-ray and radium are proving increasingly effective. Reliable clinics report that 20 to 30 per cent of the cancer cases which they treat are living

and well after five years or more. In no disease is early diagnosis more vital to successful treatment (see also page 265).

## Heart Disease

A few years ago heart disease assumed first place as a cause of death for people of all ages, and in spite of better diagnosis and treatment it is still on the increase. This is discouraging but not quite so hopeless as it might appear on first thought. Approximately 35 per cent of heart disease is due to infections involving the heart muscles and valves, 45 per cent to degenerative processes, 10 per cent to syphilis, and 10 per cent to a variety of other causes.

*Rheumatic Heart Disease.* Rheumatic fever, or so-called "inflammatory rheumatism," is an infectious disease of the body as a whole but with a tendency to affect most severely the joints and the heart. Rheumatic fever contracted in childhood is responsible for 25 per cent of deaths from heart disease up to the age of fifty years. It occurs only in humans, with first attacks most common in children between five and ten years of age. It is more frequent in cooler climates and in urban communities, more in whites than in Negroes, slightly more in females than in males. There seems also to be a definite familial susceptibility to rheumatic fever and a significant relationship between its occurrence and malnutrition and poor living conditions.

Surveys indicate that approximately 1 to 5 per cent of school children have rheumatic fever at some time or other and approximately 60 per cent of children infected give evidence of heart involvement, permanent damage being most frequent to the valves. Repeated attacks occur in about half of these who have had first attacks and about one-fourth of the patients, particularly girls, develop chorea, so-called "St. Vitus's dance," as a complication.

The cause of rheumatic fever is a type of streptococcus. The initial attack frequently is preceded by a cold, scarlet fever, tonsillitis, or some other acute respiratory infection. Transmission is from person to person either directly or indirectly by

means of hands, drinking glasses, etc. Individual susceptibility varies greatly. The majority of persons are resistant to rheumatic fever even though they get throat infections with the strain of streptococcus that causes this disease.

Efforts to control this serious and widespread disease must depend, until our knowledge of its cause is more exact, upon general measures such as isolation, the adequate care of patients during the acute stages of the disease, a properly safeguarded and regulated convalescence, attention to problems of poor housing and malnutrition, and the discovery early in life of children whose hearts have been damaged. This means the widespread careful examination of school children. Existing damage to the heart cannot be repaired but the functional condition of the heart can be determined and the children's future lives planned with intelligent consideration of the physical limits which their damaged hearts impose.

*Valvular heart disease*, other than rheumatic, usually occurs as a complication of some infection such as scarlet fever, tonsillitis, pneumonia, or abscesses at the roots of teeth. This type of heart disease can be reduced; in fact, it is being materially reduced by the prevention and better care of these infections.

*Degenerative Heart Disease.* Less encouraging is the outlook for the heart disease which, like apoplexy and certain types of kidney trouble, is an end result of the stress, strain, and degenerative processes which have been slowly undermining the circulatory system. Over many years our most useful measure in the treatment of these diseases has been rest—rest from the stress and strain of worry, of overeating, of physical activity—rest which the individual failed to provide until his body's reserves were exhausted. The hope for a reduction of these degenerative processes is not entirely a forlorn one, since the American people seem to be taking a more sane and intelligent attitude toward living. Many are beginning to ask themselves whether the mad race for material success and "keeping up with the Joneses" is worth the price. As more and more decide that it is not, they will get more joy out of living and will postpone senescence with its disintegration of vital tissues.

*Syphilitic heart disease* is a complication of syphilis which is considered in Chapter XIII.

## Acute Respiratory Infections

The acute respiratory infections are a major cause of illness at all ages but take an exceptionally heavy toll of life in infancy. Pneumonia and colds have been considered. Influenza is still unsolved. Each of these diseases is especially serious in infants and presents problems of control distinct for this age period. Exposure to respiratory infections transmitted from one person to another through the air or by means of the hands can hardly be avoided by older children and adults. But not so with infants. Infections must be carried to them. This is usually done by well-meaning parents, brothers, sisters, or other relatives. If possible, persons with "colds" should not be permitted to go into the rooms of infants, nor should they prepare or handle their food or drink. The danger of infection can be reduced also by thorough washing of the hands with soap and hot water before touching the child or its food and, if one has a cold, by covering the nose and mouth with a piece of gauze, linen, or muslin.

## Diarrhea and Enteritis

This so-called "summer complaint" of children, although greatly reduced in recent years, still remains a prominent cause of death of children under ten years of age. Food and drink are responsible for most of these infections. Hence, adequate care in the selection and preparation of foods and better sanitation in their handling are all that is necessary to eliminate them. If parents will only make use of available information concerning the preparation and care of infant foods, many children's lives can be saved.

## Measles

Measles, although frequently considered trivial, is a serious disease in infancy. In fact, the possibility of death from measles is seventeen times as great if contracted by a child under one year of age as by a child of six. This difference points the way toward which efforts to combat measles may be directed. Com-

plete prevention of a disease which, even in its early stages, is highly communicable, is impossible unless a specific immunizing agent against it can be developed. But postponement of the disease until school age when it is relatively without danger should be attempted and in many cases can be achieved.

The cause of measles is a tiny germ spread by discharges from the nose and throat. Early symptoms resemble an ordinary cold. It is in this stage that measles is most highly contagious. Hence, measures for the protection of infants against acute respiratory infections in general will also reduce their exposure to measles.

In addition to such general procedures there is available a specific preventive measure which can be utilized by physicians for the protection of children known to have been exposed to measles. This is the injection of blood serum, whole blood, gamma globulin, or placental extract from one who has had measles some time in the past. Blood from one of the parents may be used for this purpose.

The principle involved is to give the infant some of the protective substances which have been present in the blood of persons who have recovered from measles. If such injections are given within five days after exposure, the disease is usually prevented; if given from the fifth to the eighth day, a mild form of measles may develop but complications are rare. Injections given after the eighth day following exposure usually have little or no effect upon the course of the disease.

If a child gets a mild attack of measles after such injections, a permanent immunity will result. On the other hand, complete protection is temporary, although usually long enough to safeguard a child during a current epidemic. The following year the child will again be susceptible, but each year that an attack of measles can be postponed means a material reduction in the danger to the child.

## Whooping Cough

Whooping cough, which in 1945 caused the death of almost as many American children as diphtheria, measles, and scarlet fever combined, is the most distressing as well as one of the most serious

of the diseases which occur in infancy. It is caused by a known germ which is present in the secretions from the nose and throat.

The early symptoms, and in some cases the only symptoms, are those of a common cold. Hence, infants can be protected against infection only if they are safeguarded against exposure to colds or acute respiratory infections. Although vaccination against whooping cough was tried for some years with questionable success, recent studies with new vaccine are giving very encouraging results. Many of the vaccinated children are completely protected and the majority of those who do contract whooping cough after vaccination have it in a much milder form than unvaccinated children. In addition, a hyperimmune serum[6] is proving valuable both for treatment and for temporary protection. These immunizations seem to offer new hope of protecting our children against one of the most dread diseases of infancy.

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[6] Hyperimmune serum is prepared from the blood of one who, after having had whooping cough, is given injections of whooping cough vaccine.

## *Chapter* III

# MENTAL HEALTH[1]

MENTAL illnesses have long been a major cause of death and disability in this country. Federal and state governments maintain almost half a million hospital beds for patients with mental illnesses. For each one of the children now in high school who enters college, one will spend some portion of his life in a mental hospital. At the present time the mentally ill constitute about half of all patients in the hospitals of the United States. Of all separations from military service during the Second World War, 51 per cent were for personality problems. From 30 to 60 per cent of all patients who consult doctors do so primarily for complaints due to emotional disorders. Many productive persons continuously maintain a chronically neurotic adjustment to life. And most individuals have minor emotional disturbances often not recognized but of medical significance.[2]

In spite of all this, the average person has a curious attitude toward mental health. He admits the importance of physical health, realizes that not everyone who is up and about is physically well, and may even go so far as to take some elementary precautions against disease. If not exactly intelligent about

[1] Prepared in collaboration with Dr. E. M. deBerry, formerly psychiatrist of the Students' Health Service, University of Minnesota.

[2] "America's Health: A Report to the Nation by the National Health Assembly," Harper & Brothers, New York, 1949.

This boy, concerned about recurrent chest pains, consults his medical doctor.

With no physical cause apparent, the doctor suspects a mental upset and recommends a psychiatrist.

Subsequent visits bring out the fact that poor school grades were often the cause of unpleasant scenes.

Conflicts in early life often manifest themselves in emotional disturbances in later life.

Competent psychiatric treatment can help restore social and emotional balance.

(*From Emotional Health, a McGraw-Hill Text-Film*)

physical health, he is at least interested and will seek advice from physicians, quacks, or advertisements.

But in regard to his mental health his attitude until recently has been strangely indifferent. If he thinks about it at all, he regards it as something quite foreign to him, much as he might give passing attention to the antics of a foreign bandit. He considers his friends and associates as in perfect mental health; when his attention is forced to this subject by the "sudden" onset of a mental illness in someone he knows, he is surprised and shocked. If the afflicted person is a member of his own family, he attributes the disease to overwork, to worry about finances, to physical illness, or to some other socially acceptable factor. If the afflicted person is merely an acquaintance, he is likely to consider heredity, alcohol, and syphilis as probable causes. Only rarely does he try to think intelligently as to why these things happen or attempt to inform himself by reading or by consulting specialists in the field. This attitude seems particularly strange when one considers the horror with which mental illness is generally regarded.

But even when one does try to inform one's self, one meets with difficulties. In unguided reading, one finds discrepancies and confusion which may seem completely baffling.

Definite instructions for avoiding mental illness cannot be given but a general understanding of the problems and processes involved frequently helps enormously in the handling of minor emotional distresses, the neglect of which is an important factor in the development of graver disorders. Then in addition to the problem of avoiding actual insanity, a knowledge of the mechanisms leading to mental disturbance is the best guarantee against inefficiency, failure, and unhappiness in life. Few realize that the psychiatrist deals not only with the actual insanities but with all those borderline conditions and maladjustments which are not ordinarily regarded as belonging in the category of mental illnesses.

## Types of Mental Disorders

Among the mental disorders are conditions so grave that even the untrained person recognizes that the patient is insane. These

illnesses or psychoses, however, usually go unrecognized until they are so far advanced that treatment becomes exceedingly difficult. No severe mental illness ever comes suddenly "out of the blue." The symptoms are present for months or years but usually are disguised as nervous breakdown, neurasthenia, or physical illnesses.

A second group comprises persons who are not considered insane by their associates but who present various peculiar symptoms of almost any degree of severity. Morbid fears, compulsions, and obsessions, generally diagnosed as psychoneuroses with some modifying term, are particularly characteristic of this group. With these also might be placed chronic invalidism, when physical examination fails to reveal an adequate basis for the symptoms presented.

The third group consists of individuals who are apparently neither mentally nor physically sick, but who fail to make a socially adequate adjustment. It includes certain types of alcoholics, delinquents, vagrants, and persons of unusual sexual behavior. In this group we might include also those persons who, while apparently making a good social adjustment, nevertheless are tremendously hampered by feelings of inadequacy, emotional instability, fears, and other personality disturbances which interfere with efficiency and happiness.

Problem children constitute a fourth group. It is now generally recognized that difficulties of training, poor habits, school problems, temper tantrums, enuresis, and childhood delinquencies are evidences of emotional disturbance which may be corrected by proper investigation and treatment.

Feeble-mindedness is an incurable congenital deficiency with a strong hereditary basis and, as such, has little relation to mental or emotional disorders. It is primarily a problem of eugenics and sociology.

Even such an incomplete listing of psychiatric problems forces us to recognize that we can no longer regard mental illness or insanity as the only field for psychiatric investigation. Emotional disturbances and personality problems, which may be regarded as lesser forms of mental illness, constitute ever-present problems, touching all of us.

## Theory of Mental Illness

From the scientific data at hand, we have no reason to conclude that heredity is a major factor in the causation of mental illnesses. In spite of this, heredity is commonly believed to be their most important cause. This belief is unfortunate, for the assumption that mental illness is caused by heredity leads to the conclusion that it cannot be prevented or cured.

To assume that a mental illness is hereditary because it "runs in a family" is erroneous, because it is impossible to separate the effects of environment, or so-called "social heredity," from those of physical heredity. By social heredity is meant the transference of traits of character or types of behavior by contact with and imitation of those persons with whom one lives, while physical heredity implies the transmission of characteristics or types of behavior through the reproductive cells. One has only to consider the abnormal environment which exists in a family in which there is a mentally ill person, to realize the great possibility of a child in such a family becoming mentally unbalanced, even though no hereditary factors are active at all. In order to establish the hereditary character of a disease one must demonstrate that the disease was not caused by environmental factors and that it follows recognized laws of inheritance. Neither of these requirements has been met in the case of most mental diseases. Furthermore, it does not follow that, even if a hereditary factor were present, the development of the disease could not be avoided by the manipulation of environmental factors. Hence, we shall do well to turn our attention from the heredity theory of mental illness to what may be more profitable approaches.

Certain mental illnesses have a definite physical basis. For example, the psychoses of general paresis,[3] arteriosclerosis, senility, injury, brain tumor, etc., are due directly to destruction of brain tissue.

Furthermore, delinquency, hallucinations, fears, compulsions, or other emotional disorders may be due to disturbances in the functioning of the glands of internal secretion; to infectious processes, the toxins of which give rise to states of delirium; to

[3] A type of mental disease due to syphilis.

the action of drugs; or to actual destruction of brain tissue. Such conditions may, and do, give rise to strange thinking and behavior. Their prevention and cure are problems of physical health, just as are the prevention and cure of any other physical disease.

On the other hand, ideas and emotional attitudes are more often a product of the social environment than of physical disease. A man may let his hair grow to shoulder length because his thinking has been deranged by the activity of the spirochete of syphilis in the cortex of his brain; or he may wear his hair long because he has been taught a religious belief in which long hair is worn as a symbol of the Christlike life. In the first case, we explain and treat his unusual behavior on a physical basis. In the second, we explain it in psychological and social terms.

In the investigation and treatment of the abnormal behavior and thinking which constitute the material of poor mental health, it is necessary both to investigate those physical disturbances which may interfere with the complex functions of behavior and belief and to recognize those factors in the environment which may disturb these same functions. There is no real dichotomy or conflict in these approaches. In some cases physical disturbances predominate, while in others mental and social situations are of major importance.

## The Mechanisms of Mental Ill-health

The behavior of the mentally ill patient is not qualitatively different from that of healthy persons or from his own behavior before his illness developed. In fact, the behavior and the thinking of the mentally ill are strange only because they are exaggerated or inappropriate to particular situations. Moreover, when the history of a mental patient is carefully studied, it is found that his illness is the logical and inevitable outgrowth of his experiences and his interpretation of those experiences. The illness then presents itself as the only way left for that particular individual to solve the problems which have arisen as the result of his interpretation of and reaction to his experiences. It is found, moreover, that the solution, that is, his mental illness, is

not a new one but is an exaggeration of methods which he has used before and which everybody uses to greater or lesser degree. But because he uses these methods at the expense of more healthy and efficient ones, the patient accumulates dissatisfaction and a poor equipment for handling this dissatisfaction. This may be illustrated by the example of the chronic invalid who avoids uncomfortable duties or responsibilities, or acquires attention, by becoming ill. This simple procedure accounts for a large number of the so-called "neurotics" and "psychoneurotics" who crowd the hospital clinics and the consulting rooms of physicians and who manage, quite unconsciously, to make the lives of their families and friends, as well as their own lives, unhappy.

*Avoidance of Unpleasant Situations.* A boy, aged ten, wakes one morning with a cold. He is not very sick but is kept in bed as a precautionary measure. During the course of the morning his condition improves. His mother lets him get up and play about the house and entertains him with stories and games. He is not in the habit of getting so much attention and he enjoys it. He particularly enjoys it at this time because he has been having difficulty at school. He is slightly nearsighted, but this defect has not been noticed. It makes it difficult for him to see what is written on the board. For this and various other trivial reasons he is behind in his school work. He doesn't try hard to catch up because he feels hopeless about it. He makes small troubles in the classroom instead. The teacher doesn't like him, or at least he thinks that she doesn't, which amounts to the same thing.

After being out a day or so with his cold, he returns to the classroom even farther behind than he was. He is punished for inattention and making a nuisance of himself. Things go from bad to worse. Even on the playground he can find no satisfaction. He is small for his age; he has never acquired skill in the games that other boys play. He feels his inadequacy and allows himself to be bullied because he hasn't enough self-confidence to "stick up for his rights." Things go on like this for a week or two, getting steadily worse. Finally matters are about to reach a climax.

His teacher has given him a note to his mother about his bad conduct. The boy has destroyed the note. There is a new bully on the playground who promises to "beat him up" the next time he catches him. He manages to elude the bully on his way home that afternoon; he stays safely in his own backyard. But the next morning he no sooner wakes than he realizes the disagreeable situation. He dreads going to school and wishes he could stay at home. He remembers the last time he stayed at home; he was sick that time. He asks himself if he is sick now. By the time he gets to breakfast he is really feeling unwell. He complains to his mother. He is not malingering, because by this time he really feels uneasy in his stomach. Remembering his illness of the week before, his mother is a little worried. She allows him to remain at home, intending to take him to see the doctor. But the boy has discovered a way of getting out of unpleasant things. It isn't a good way, and he gains nothing in the long run; in fact, he only makes matters worse. If the situation remains the same, he will get sick again and again until he becomes a chronic invalid.

But suppose his parents realize what he is doing and set about changing things in a rational way. His eye defect is correctable; he could be given special tutoring to catch up with his class or, if necessary, changed to another school where he could make a new start. His satisfaction in play could be improved if he were sent to a camp in the summer or were given instruction in sports. It usually is easy to correct the habit at this stage.

On the other hand, if this boy continues to be sick, he will keep on becoming sick in more critical situations all of his life, and when he gets to be an adult he will do it in the face of important situations. In this case he will become a chronic invalid and be diagnosed by one physician after another as a neurotic, a psychoneurotic, or a hysteric.

*Parental Domination.* Adolescence gives rise to an increasing urge for independence and personal responsibility on the part of all normal children. Parents should prepare themselves and their children for this by the development of an attitude of mutual helpfulness and respect. If this is not done, as occurs all too

frequently, conflicts arise as a result of the efforts of parents to continue their domination and the struggle of their children for independence.

When this occurs, warping of the child's personality is likely to result. Either rebellion or submission is unfortunate. Rebellion, without self-discipline and training in the assumption of responsibility, may lead to serious antisocial acts, while submission, which continues during adolescence at childhood levels of dependence, may handicap the individual throughout his or her whole life.

*Daydreaming.* It is out of dreams of better things that ambition, inventions, scientific discoveries, and social movements are born. He who does not "dream dreams" is dull and unimaginative. Yet daydreaming may come to be a source of emotional satisfaction and a substitute for real accomplishment. It is easier to achieve success and to escape unpleasant situations in a world of make-believe than in a world of reality. For this reason excessive daydreaming is likely to interfere with one's normal development.

Most persons daydream occasionally; some daydream excessively; and a few, whom we know as patients with dementia praecox, live continuously in a world of phantasy. The solution for the daydreamer is to turn his dreams into reality and to seek opportunities for satisfaction in achievement.

*Inferiority Complex.* Every intelligent person experiences feelings of inferiority at certain times and in certain situations. Such feelings are not abnormal and need not be disturbing. No one can excel in everything and few reach the limit of their ambitions in anything.

If one has handicaps or limitations, they should be recognized and considered in relation to one's abilities and capacities. On the basis of such an appraisal one should turn his energies into those fields in which he has the greatest chance of achieving success and satisfaction.

*Superiority Complex.* It is just as natural for one to feel superior in certain situations as it is to feel inferior in others. Some persons feel and act superior because of wealth, good looks,

athletic skill, etc. This usually leads to unpopularity and to an unhealthy mental and emotional state.

Many persons who seem to exhibit a superior attitude are really overcompensating for feelings of inferiority. The man whose daily work makes him feel inferior and the woman who is unsuccessful in her social contacts are apt to be tyrants with their families. A ruthless judge on the bench may be a "worm" at home.

No one is perfect. Everyone has his good points as well as his faults. Overattention to either is undesirable. In order to be in a contented and healthy state of mind one must accept oneself as one is, make the most of one's capabilities and opportunities, and not be too discouraged with achievements which fall below one's aspirations.

*Worry* is an ineffectual expenditure of time and nervous energy upon uncertainties or upon situations beyond one's control. For the most part worry is confused and disorganized thinking, which interferes with both accomplishment and peace of mind. To avoid this common weakness, one must make decisions upon the best available information and be content with such decisions. At times additional information is needed before an intelligent decision can be made. In such instances the problem should be put out of mind until the necessary information has been obtained and a decision is possible. Otherwise indecision and procrastination lead to delay, confusion, and worry.

Worry over mistakes that one has made, uncertainties ahead, or situations beyond one's control obviously can be of no avail. Yet such worry is difficult to avoid. Concentration upon one's work or one's hobbies and participation in sports, particularly if this involves physical exercise, will help to replace worry with organized thinking and activity.

Refusal to face difficulties or unpleasant situations gives rise to emotional conflict and worry. Discussion of one's problems with an understanding physician or friend frequently provides relief from their burden and may lead to a solution. To many religion or philosophy serves as a stabilizer and as an anchor in the storms of emotional conflict.

*Psychoneuroses.* Some persons, young and old, facing insecurity, failure, unpleasant tasks, or embarrassment find an acceptable escape through illness. This is usually entirely subconscious. Therefore, the patient is dissatisfied when his physician says that there is "nothing organically wrong with him." His pain is just as real to him as though it were caused by organic disease, and if his physician does not discover its cause and recommend appropriate treatment, he is likely to drift into the hands of anyone who promises to help him.

The symptoms which may accompany the psychoneuroses are legion: headaches, abdominal pain, diarrhea, nausea, vomiting, rapid heartbeat, shortness of breath, blurring of vision, paralysis, etc. Careful investigation of such a patient's symptoms, worries, and anxieties may reveal the basic cause of the trouble, although the services of a psychiatrist are frequently necessary for both diagnosis and treatment.

### *Sex Conflicts*

The whole subject of sex has too long been shrouded in mystery and fear—fear nourished by ignorance and misunderstanding. Other fears of mankind have been dispelled by understanding. We have learned that many diseases are caused by bacteria and viruses and not evil spirits. Consequently we no longer feel an irrational terror of disease but try to control it by isolation, inoculation, and chemotherapy. If sexual matters were similarly understood and openly considered by all, the sexual fears and conflicts so prevalent in our civilization would disappear.

Perhaps the greatest obstacle to universally healthy sexual attitudes is the fact that although many parents realize the value of sex education they feel inadequate and ill prepared to offer guidance to their children. They are still afflicted with inhibitions, embarrassment, and a feeling that sex is unclean. As a result the child gathers independently a distorted, unhealthy collection of misinformation and misinterpretations.

Logically there is no reason why the psychosexual development of the individual should be regarded in a different light from other bodily functions. At each stage of development certain manifestations appear for which the child should be prepared. He is more harmed by anxiety and fear of things he doesn't understand in regard to sex than by possible premature indulgence.

The injudicious handling of sex curiosity in young children may have lasting effects. Many of the barriers that prevent a normal, healthy response in adolescents toward members of the opposite sex have their origin in such early

encounters. A deep-seated fear of sex may lead to repressions that make the young girl or boy shrink within a shell of reserve that they cannot explain. Years of maladjustment and unhappiness may result from a few moments of mismanagement.

The most effective safeguard against the development of sex conflict in adolescence is a campaign of sound sex education for both parents and children. The guiding principle for parents should be honesty and an air of casual frankness. It is not necessary to attempt a full discussion of biology in one sitting, for such earnestness and overemphasis is as extreme as complete refusal to discuss the topic. In answer to the child's questions about other things it is not customary to sit down and give him a full lecture on each subject. A simple, honest answer to his question is all that is needed, and although the original question may be followed by others for elaboration, the subject is soon dropped and the youthful mind follows its natural course to other things. The child's interest may appear first in questions about his own origin and if the answers are supplied without emotional display or concern the child accepts them matter-of-factly. These suggestions may seem obvious to us but it is amazing how many of the children who come under observation at the clinic are totally ignorant of the scientific fundamentals of sex.[4]

*Individual Problems Complicated.* Various types of emotional reactions, only a few of which have been discussed, are usually operative in producing the symptoms exhibited by a given individual. This is well illustrated by the following case report: The patient was a young man in college, who came to the psychiatrist with the following complaints. For four years he has tried in vain "to get control of himself" and has become thoroughly discouraged and about "at the end of his rope." He has had mastoid, sinus, and tonsil infections which he thinks have affected his mind. For the last three years he has been intensely unhappy—has made no friends, because "people despise him." He says that he is a physical coward and is "mentally tortured by bad habits." Ideas run through his head so that he cannot sleep. At times he has felt that people were reading his thoughts and watching him on the street; and occasionally he believes he is going insane and has resolved to commit suicide.

This young man's childhood was unhappy, owing both to unfortunate neighborhood conditions and to the incompatibility of his parents. During most of their married life his parents were

[4] Clarke, Eric K., "Mental Hygiene for Community Nursing," pp. 108–109, University of Minnesota Press, Minneapolis, 1942.

kept together more by financial and religious considerations than by any regard for each other. Finally, the father decided that the only way out of the difficulty was to break up the home. Unable to talk it over reasonably with the patient's mother, and in order to avoid a painful scene, he sent the family to another city, where he had arranged a home for them. He also provided that the mother receive a certain sum of money each month for the support of herself and the two boys. At this point the father dropped out of the picture, as he went to another state to reestablish himself in business.

The boy's early social contacts were unfortunate. He had several prolonged illnesses, which affected him physically to such an extent that for a time he was unable to compete with other boys in physical things. Moving into a new community made this doubly hard. He was bullied unmercifully by other boys. Finally, he came under the domination of a boy who was living in the same apartment house—a boy somewhat older, rather stupid, but well developed physically. The latter assumed a sort of protective attitude toward the patient. It was from this boy that the patient had his first sex instruction. He was taught to masturbate and at the same time told that it would hurt him physically. He confessed his first experience to his mother, who was horrified and shocked. She told him that this was only a confirmation of her belief that he took after his father in his weaknesses. She told him that his father had always been sensual and impressed the boy with her disgust for masturbation and with her conviction that it was a great sin. He made a resolution to stop, broke the resolution, made another, and with each attempt became more and more convinced that he was unable to combat this evil. He felt that he must conquer it in order to prove to himself and his mother that he was not a weak character, sinful by nature, etc. It became to him a sort of symbol of his whole struggle against the idea of evil. If he could conquer this thing, it would mean that he could conquer the weakness he had inherited from his father, he would regain the respect and affection of his mother and be able to compete with his younger brother for her regard.

His idea about masturbation added to his difficulties with other boys. He felt that not only was he physically handicapped by the illnesses which he had had and his subsequent awkwardness but also that he was not equal morally to the other boys in his group. He heard from some of them that one could always tell a masturbator by the pimples on his face and the inability to look a man in the eye. He became even more self-conscious and developed a fear that his habit would be discovered. As a result, he avoided meeting other boys and stayed at home a great deal, neglecting physical exercise and recreation. About this time there were in the neighborhood several bullies. They were quick to recognize the patient's attitude, and on one or two occasions waylaid him on the way from school, challenging him to fight. He was frightened and ran. On the only occasion when he did put up a fight because he could not get away, he was severely beaten up by the two boys. This convinced him that he was a physical coward and added to his already growing disgust with himself.

In his university courses, this boy had shown an uncanny ability to pick out bits of information which tended to confirm certain things which worried him. He learned something of the biological theory of heredity and was strengthened in the belief that he had inherited his father's weakness of character. He learned something of scientific determinism, interpreting it to mean that man is in no way a free agent, and that it is impossible to develop one's will power if one does not already have it. He heard of the evils of the so-called "inferiority complex" and, having found a word under which he could sum up his problems, he was more than ever impressed by the magnitude of them. Although he made good grades, success in this was of little value to him—not enough value, in fact, to act as a compensation for the other failures. He therefore lost interest and began to neglect his studies. Above all things he needed that recognition, friendship, social contact, which his own feelings prevented him from getting.

It was found at the outset that any simple explanation and advice would not be of any value to the patient. He had already

had such explanations from various competent faculty advisers. What was required was a thorough emotional reeducation. It is obvious from the account of the patient's life that his problems were deep-seated and involved such fundamental relations as that of the patient toward his family, toward religion, and toward the problem of sex. The patient was unusually intelligent and cooperative throughout the procedure. He was seen at least three or four times every week; and although there have been times when he showed great depression, on the whole his progress has been marked.

At present this boy is handling the family situation well. He is no longer irritable, quarrelsome, and seclusive at home. He has been able to make several valuable acquaintances on the campus. He is now quite able to apply himself consistently to his work, and his grades have improved. He has chosen a profession and, even though he is not yet ready to enter his professional training, he is exceedingly interested in it and had done a great deal of outside reading on related subjects. He has solved the sex problem satisfactorily and is not masturbating or doing any unusual amount of phantasying about sex things. He no longer believes himself a coward.

*The Logical Result.* With such histories it is impossible to escape the conclusion that the resultant mental condition is the logical and inevitable outgrowth of learned methods of behavior, that these methods with variations probably would have been adopted by almost anyone subject to similar situations, and that the final symptoms which appear to be so abnormal are essentially the reactions found in every normal person under certain circumstances. These things hold true not only for the simple types of cases described above but for most of the other mental illnesses. Thus the patient with dementia praecox lives in a dream so deep that it shuts him off from all contact with reality. He derives his satisfaction from imaginary companions, activities, and achievements. This is precisely the same method used by child and adult when they daydream gratification they have been unable to derive from reality. The dementia praecox patient behaves like a child in getting pleasure from the infantile

activities which the adult has so outgrown that they seem senseless and disgusting. This finds an exact parallel in the normal adult who, when meeting an obstacle which he is unable to overcome, exhibits childish temper or drops the work to indulge in play.

## The Basis of Prevention and Treatment

If we accept this explanation of mental and emotional disorders, the general trend of prevention and therapy is immediately obvious. If mental illnesses are the result of learned reactions, gradually acquired, therapy becomes a process of reeducation, during which the patient unlearns old unhealthy emotional and mental habits and acquires new and more efficient methods. This is a general principle that underlies all the modern therapeutic procedures, however varied these appear to be on causal inspection.

Freudian psychoanalysis consists primarily of the conscious recall and emotional reenacting of the infantile repressed memories, which are reinterpreted during the analytic procedure—essentially a reeducational process. Adler's attempt to redirect the patient to a better or more socially acceptable goal than that which had been acquired through previous maladjustment is likewise an educational procedure. Those who practice suggestion, persuasion, and similar methods are doing the same thing on a more superficial level. Even the rest cures, sea voyages, and changes of occupation so often recommended probably owe their effectiveness to the new viewpoints acquired by the patients as the result of removal from old associations and activities.

All such methods have been found to be surprisingly effective, which seems, in a purely empiric fashion, to substantiate the belief that mental illnesses are psychological phenomena, the result of experience and interpretations of experience; and that cure consists in a reinterpretation in one manner or another. Likewise, prevention will be logically directed against environmental factors which tend to produce or exaggerate unhealthy adaptation and toward the correction of such reactions before

they have become such an ingrained part of the individual's equipment that he will use them in serious matters and will fail to develop others.

Most emotional maladjustments have their basis in experiences of childhood, experiences which occur before the individual has the power to control the forces that play upon him and before he has learned to judge his reactions to these forces. By the time the age of discretion is reached, most persons have developed certain emotional habits which are unhealthy. But this is nothing to worry about unless the number of these habits is sufficiently great or their use sufficiently frequent to interfere with happiness and efficiency.

Occasionally one needs the advice of a physician trained in the field of psychiatry to correct unhealthy emotional habits. But more commonly one is able to work out one's own solution, especially if one understands the types of problems and the mechanisms involved. On the other hand, even the "average person," fairly well adjusted to life, in whom there are no long-standing or deeply seated conflicts, may, by the neglect of a few relatively simple and self-evident principles, tangle his emotional life to the extent of completely incapacitating himself for happiness. It is not within the scope of this book to discuss these principles at length; but although they appear dogmatic when stated briefly and without modification, a few of them will be set down, in the expectation that the reader will realize their importance and supply for himself the necessary modification and enlargement.

Emotional difficulties are not likely to become serious in a person who is thoroughly conscious of what he wants from life and is willing to face the difficulties involved in getting it. This makes knowledge of the facts about one's self a fundamental necessity. One must accept one's physical and intellectual handicaps in order to plan a satisfactory life inside these limitations. There are thousands of people suffering from hopeless frustration because they set a goal for themselves which is beyond their abilities.

Ann Bridge expresses this well in a sentence from her book "Illyrian Spring":

> Freedom consists of two things; to know each one his limitations—that is the same thing as to know one's self and to accept one's self as one is, without fear, or envy or distaste; and to recognize and accept the conditions under which one lives, also without fear, or envy or distaste. When you do this you shall be free.[5]

On the other hand, it is equally dangerous to use one's handicaps as an excuse for not attempting some useful and satisfactory work. Everyone has his capabilities as well as his limitations. These assets he should take stock of so as to direct his efforts along lines in which he may expect the greatest degree of accomplishment and personal satisfaction.

These facts about oneself include more than one's physical and intellectual endowments. Emotional attitudes, desires, and ambitions are equally a part of one's equipment. They must be recognized and given their proper weight. Satisfaction of emotional needs is a primary necessity for mental health, but such satisfaction requires evaluation, planning, and control. This means a plan of life in which the deepest emotional needs of the individual are given the greatest attention and in which every precaution is taken against their frustration. The plan must make room also for lesser desires which, although subordinated to the major aims, will be given adequate expression. In general, these requirements are best met by the one who, in addition to his chief work, cultivates a taste for the arts, develops hobbies, enjoys friendships and play, and takes an interest in public affairs or other matters beyond the sphere of mere personal concern.

*Poise* is one of the most admired personal characteristics of young and old. It suggests easy self-assurance without conceit. The cultivation of poise depends primarily upon mastery of one's self, which in turn implies good mental health. "He that ruleth himself is greater than he that taketh a city."

*Happiness.* The attainment of happiness, with all that that implies, is the goal toward which most of our efforts in life are

[5] Ann Bridge, "Illyrian Spring," p. 252, Little, Brown & Company, Boston, 1935.

directed. Yet all too frequently we follow false beacons along life's highway leading to this goal. The modern Chinese philosopher, Lin Yutang,[6] wrote, "The only problem unconsciously assumed by all Chinese philosophers to be of any importance is: how shall we enjoy life, and who can best enjoy life? No perfectionism, no straining after the unattainable, no postulating of the unknowable; but taking poor, mortal human nature as it is, how shall we organize our life that all can work peacefully, endure nobly and live happily?" He answers his own question by saying, "The ideal character best able to enjoy life is a warm, carefree, unafraid soul." Most of us by intelligent voluntary effort can develop these qualities.

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## Text-Films

The following McGraw-Hill Text-Film on Health Education is recommended for use with this chapter of the text.

*Emotional Health* (20min sd MP).[7] In following the progress of a case history of a single college freshman, this film aims at removing the stigma associated with emotional upsets, and establishing psychiatric techniques as the *normal* treatment of persistent emotional disturbances.

Silent follow-up filmstrip based on material contained in the motion picture offers opportunity for review, testing and further discussion.

[7] The running time (min), whether it is silent (si), or sound (sd), and whether it is a motion picture (MP) or filmstrip (FS), are listed with each title throughout the book. All the motion pictures are 16 mm; filmstrips are 35 mm.

*Chapter* IV

# NUTRITION AND GROWTH

EVERY living thing, from the simplest form of plant life to the most highly developed animal organism, must have food; food for growth, food for energy, food to regulate body processes, and food to replace worn-out tissues; food adequate in amount and of proper composition. The process which we call "digestion" is the preparation of this food so that it can be utilized by the cells of the body.

The products of digestion are taken from the intestinal tract into the blood, which carries food, water, and oxygen to the cells and removes the waste products of their activity. The food needs of the body, then, become the food needs of its individual cells.

The foods which these cells must have and are able to utilize are divided by the chemist into the following groups: water, proteins, carbohydrates, fats, vitamins, and minerals.

Except for water and certain minerals, the ultimate source of man's food supply is the plant kingdom. Even the food of the Eskimo, which consists almost entirely of animal tissues and animal products, comes indirectly from plants. Plants utilize the energy of the sun; the oxygen, carbon dioxide, and nitrogen of the air; and the water and mineral salts of the soil, to manufacture the carbohydrates, fats, proteins, and vitamins which serve as foods for man and animals.

## The Need for Water

The body is a chemical machine which builds new tissues, replaces worn-out ones, and provides heat and energy. These chemical changes upon which life depends take place in solutions.

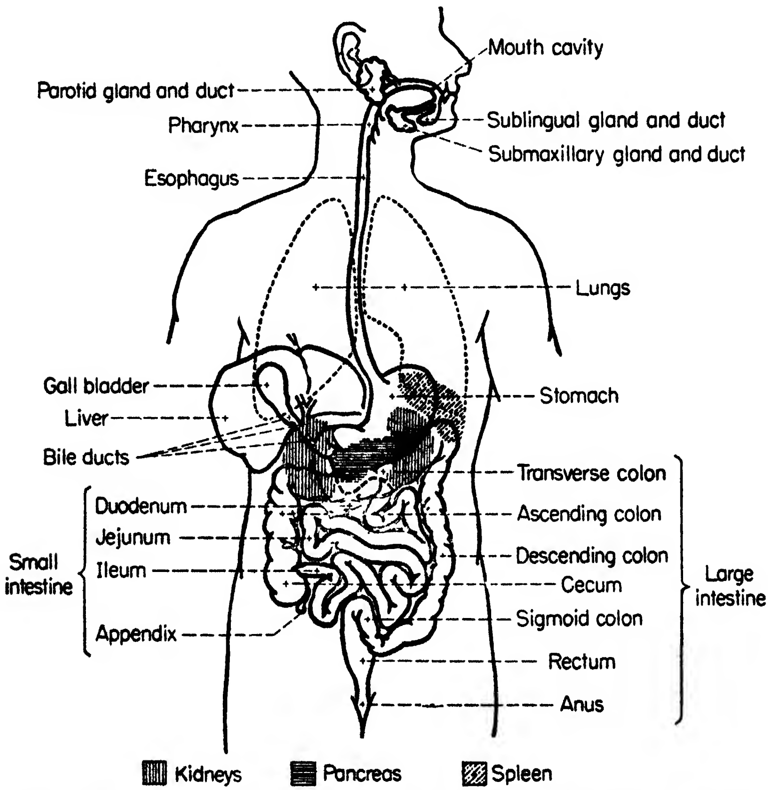


FIG. 2. ALIMENTARY CANAL WITH DIGESTIVE GLANDS (SEMISCHEMATIC DRAWING).

In solution foods are digested, the products of digestion carried to the tissue cells, and the waste products taken away.

Water makes up the major portion of every secretion of the body. It plays an important part in every healing process. It regulates body temperature. Truly in the body we have "water, water everywhere." Hence, water may well be considered the most important single constituent of the living organism. A

man may survive a month or longer without food but death will occur within a few days if he is deprived of water.

The important sources of body water are water taken as drink, water contained in food, and water formed in the oxidation (burning) of foods in the body. Water is lost from the body in the urine, in the feces, in perspiration, and through evaporation from the skin and lungs.

The amount of water which the body requires varies with age, exercise, diet, temperature of the body, and temperature and humidity of the surrounding air. Under average conditions an adult requires approximately three quarts of water per day. An ordinary diet will provide two-thirds of this amount with the food. The rest needs to be taken in the form of drink.

It is impossible to state exactly just how much water one should drink each day in order to provide optimum conditions for the various physiological processes of the body. In hot weather one needs more water than when it is cold, and more when exercising than when inactive. Under average conditions six glasses of liquid per day, in addition to that contained in the food, are commonly recommended. This quantity is more than sufficient to replace the fluids lost from the body in 24 hours and hence will supply the needs of the body and leave a margin of safety.

Fortunately we do not need to rely on theoretical computations of the amount of water which the body needs, for nature has provided a mechanism to insure an adequate fluid intake. This mechanism is the sensation of thirst, which under normal conditions can be relied upon to prevent any serious deficiency of water in the tissues.

The taking of large quantities of water is advocated and practiced as a health measure by many people. Some drink the water as it occurs in nature; others add a small amount of salt. Water in excess of that needed by the body is promptly excreted by the kidneys unless it contains salt in approximately the same concentration as salt occurs in the blood. Although the excretion of excess water ordinarily is of little or no importance, the drinking of large quantities of water after excessive sweating

may result in severe headache, abdominal discomfort, cramplike pains, and muscle tremors—"miner's cramp" or "stoker's disease." If salt is added to the water in the proportion of a level teaspoonful to a quart of water, greater retention of the fluid results and the probability of such symptoms is reduced.

The supposed ill effects of drinking water with meals have not been confirmed by physiological experiments, for it has been shown that the digestive ferments act just as efficiently in dilute as in more concentrated solutions. On the other hand, saliva is of great importance for the digestion of starches; hence, the drinking of water is no substitute for thorough mastication and salivation of food.

As practical generalizations concerning the body's needs for fluids, we may conclude that thirst is a safe and reliable criterion of the amount of water which is needed, that there is a greater likelihood of taking too little than too much fluid, and that six glasses of liquids a day, in addition to that contained in the food, is a reasonable estimate of the average desirable intake.

## The Minerals of the Body

The body contains certain inorganic, or mineral, salts. In a newborn child these amount to about 3 per cent of the total body weight; in an adult, about 4½ per cent. The chief of these are calcium, enough to make 7 pounds of lime; phosphorus, about 2 pounds; sodium, to make a shaker of table salt; iron, for a good-sized nail; iodine, about a tenth of a drop of the tincture; and small amounts of sulphur, potassium, chlorine, copper, manganese, etc. Although these minerals are absolutely essential to health, many of their functions in the body are not completely understood.

Most of the *calcium* and *phosphorus* is in the bones and teeth, but the regulation of the irritability of the nervous system is an equally important function of calcium in the body. In fact, if the amount of calcium in the blood falls much below its normal concentration of about 1 part in 10,000, muscular spasms result and generalized convulsions may occur. The requirements of calcium and phosphorus, although continuous throughout life, are

greatest during childhood and pregnancy. During these periods the American diet may be deficient in these minerals. Fortunately, milk is sufficiently rich in both calcium and phosphorus that a quart a day will supply the needs of infants for both of these elements. In older children and adults the relative amount of milk in the diet usually is smaller. Hence, the diet needs to contain other foods rich in these elements, such as cheese, bran, fish, beans, chard, beef, chicken, eggs, peas, and cauliflower.

*Iron* is utilized by the body primarily for the formation of hemoglobin. Hence, it is an important factor in determining the capacity of the blood to transport oxygen to the tissues. Certain studies indicate that many infants, particularly those born prematurely, do better if their usual diets of milk and cereals are supplemented with iron or iron-containing foods. The addition of the yolk of one egg per day to the milk diet of infants has been estimated as adequate for ordinary requirements. Deficiency of iron in older children and adults is unlikely if their diets contain meat, eggs, spinach, cabbage, beans, celery, tomatoes, apricots, peaches, prunes, apples, or other foods with a relatively high iron content. Most patients with the more common types of anemia are greatly benefited by large doses of iron salts.

*Copper.* Nutritional studies indicate that animals on a diet of raw milk, which usually has a low iron content, do not grow normally even though this diet be supplemented with iron. However, if pasteurized milk is substituted for raw milk, normal growth results. The explanation offered is that copper aids in the utilization of iron by the body and that in the process of pasteurization infinitesimal but adequate amounts of copper are absorbed by the milk in its passage through the copper pipes of the pasteurizing machine.

*Iodine* is another chemical element which, although necessary only in minute amounts, is essential to health. Its use in the body is primarily in connection with the function of the thyroid gland. If the iodine intake is insufficient, the thyroid gland enlarges and the condition known as "simple goiter" results. At times some stunting of growth accompanies this iodine deficiency.

Goiter and iodine deficiency are found chiefly in inland regions, *from the soil of which for countless ages the iodine salts have been washed toward the sea. As a result of the low iodine content of the soil the iodine content of water, of plants, and of animal tissues in these regions is low.* Sea water, marine plants, and sea food, on the other hand, have a high iodine content. In recent years efforts have been made to assure to populations, and particularly to children, in goiterous regions the amount of iodine which the body requires. This amount is small, probably no more than 50 to 100 milligrams per year—0.0015 to 0.003 ounce. It may be administered daily, weekly, or at intervals of two or three months.

The methods usually advocated for supplying the necessary iodine are the use of foods rich in iodine, the use of iodized salt, the addition of iodine to the water supply, or the administration at regular intervals of tablets containing iodine. Any of these methods is satisfactory but the one which seems to reach the greatest number of people is the use of iodized salt. This is a simple, inexpensive method of administration which has been shown to be effective. In a city in Michigan 12.5 per cent of 89 children who had not been using iodized salt were found to have goiters, while only 0.1 per cent of 900 children who had been using iodized salt for three or more years had goiters. Persons with goiters should be under medical supervision and should not attempt self-medication, even with iodized salt.

*Alkaline Foods.* Alkaline foods, drinks, and drugs are constantly recommended through advertising channels because of their alleged health value. It is implied that acidosis in a mild degree is very common and that it is associated with susceptibility to infection and various forms of ill-health. Actually there is no scientific evidence to support these assertions. Acidosis may occur in the advanced stages of diabetes; but this is a distinctly abnormal condition in which the accumulation of acids in the tissues is the result of incomplete metabolism of fat. In normal individuals on average diets it has not been demonstrated. In fact, neither of two subjects who lived on an exclusively meat diet for 12 months showed any evidence of acidosis. Certainly,

then, there is no reason to be concerned about acidosis when one is using fruits, vegetables, cereals, milk, and dairy products.

## The Need for Proteins

Proteins alone contain the nitrogenous compounds out of which new tissue can be built and worn-out tissue repaired. Hence, protein is a basic essential of the diet. Chemically, proteins differ from the other foods primarily in that all proteins contain nitrogen. Proteins also contain carbon, hydrogen, and oxygen, and many contain sulphur, phosphorus, iron, and other minerals. Plants put these chemical elements together in various proportions and combinations to form nitrogenous compounds called "amino acids." At least twenty-five of these amino acids are known to the biochemist. They constitute the building stones out of which all proteins, whether they be from plants or animals, are constructed.

Plants manufacture the amino acids which they need for growth. Animals are not so self-sufficient but are dependent upon plants for these essential elements of tissue building. Man secures part of his supply from animal foods, but these come to him unchanged from the plant cells in which they have their origin.

Some proteins contain all the amino acids that are necessary to health, while others, such as gelatine, are lacking in certain ones. In order that all of the essential amino acids may be available, it is important that the proteins of the diet be derived from various sources.

In the process of digestion proteins are broken down into the amino acids of which they are constituted. In this form and only in this form can they be utilized. If digestion fails to break them down to this stage, they will pass through the intestinal tract and be excreted as waste products. The amino acids are absorbed from the intestinal tract into the blood stream and carried by the blood to the tissue cells which are in need of them. Although needed continously, amino acids are not stored by the body. Hence, it is important that the diet supply each day the amount necessary to support growth and tissue repair.

TABLE 3

DIGESTION AND ABSORPTION

| Portion of Digestive Tract | Digestive Juice | Secretory Glands | Digestive Enzymes or Ferments | Foods Digested | Digestion Carried to Stage of | Absorption |
|---|---|---|---|---|---|---|
| Mouth | Saliva | Salivary | Ptyalin | Starches | Double sugars | None |
| Stomach | Gastric juice | Gastric | 1. Pepsin<br>2. Rennin | 1. Proteins<br>2. Milk | 1. { Proteoses, Peptones<br>2. Casein | Practically none<br>Small amounts of alcohol and glucose |
| Duodenum, *i.e.*, first part of small intestine | Pancreatic juice | Pancreas | 1. { Trypsin, Myopsin<br>2. Steapsin<br>3. Amylopsin<br>4. Maltase | 1. Proteins<br>2. Fats<br>3. Starches<br>4. Maltose | 1. { Proteoses, Polypeptides, Amino acids<br>2. Glycerine and fatty acids<br>3. Double sugars, maltose<br>4. Glucose | Some absorption of water, salts, vitamins, amino acids, single sugars, emulsified fats, fatty acids, and glycerine |
| | Bile | Liver | None | Fats | Emulsifies and so prepares for digestion and absorption | |
| Jejunum and ileum, *i.e.*, second and third portions of small intestine | Intestinal juice | Glands in wall of intestinal tract | 1. Erepsin<br>2. Maltase<br>3. Invertase | 1. Proteins and split products (peptones, etc.)<br>2. Maltose } 3. Cane sugar } | Amino acids<br>Simple sugars | Major absorption of water, salts, vitamins, amino acids, single sugars, emulsified fats, fatty acids, and glycerine |
| Large intestine | None | None | Mainly bacterial enzymes | Fermentative and other actions on undigested foodstuffs | | Water |

Although the principal use which the body makes of proteins is for the growth and replacement of tissue, proteins may be oxidized to serve as a source of heat and energy. In fact, a gram of protein upon oxidation yields the same amount of heat as a gram of carbohydrate. However, the digestion and assimilation of proteins utilize more energy and produce more heat than the digestion and assimilation of carbohydrates. Hence, it is usual for the diet to contain a smaller proportion of protein foods in the summer than in the winter. Proteins also are less readily oxidized than carbohydrates and upon oxidation leave waste nitrogenous products to be excreted. For these reasons proteins are less desirable as sources of energy than are the carbohydrates and fats.

The protein requirements of the body vary with the rate of growth and with total energy intake. Approximately 10 per cent of the food of a nursing baby is protein. The diets of infants are usually planned so that 10 to 15 per cent of the total energy content will be derived from proteins. In older children and in adults 10 per cent, or about ½ gram of protein per pound of body weight, seems adequate. On the other hand, a diet without a reasonable content of the high protein foods, such as meat and eggs, is unappetizing to many people, and there is no convincing evidence that moderate amounts beyond the minimum requirements are harmful. Hence, the use of proteins up to 10 to 12 per cent of the diet is considered a reasonable protein allowance. In general terms, this means that one average portion of meat or meat substitutes per day, together with eggs, milk, and other protein foods, is adequate.

## The Need for Carbohydrates

The carbohydrates, which occur in our foods chiefly as sugars and starches, are combinations of carbon, hydrogen, and oxygen, with the hydrogen and oxygen always in the same proportion as in water, that is, two parts of hydrogen to one part of oxygen. Carbohydrates can be utilized by the tissue cells and absorbed into the blood stream only as simple sugars, such as dextrose or glucose. Cane sugar and beet sugar, called "saccharose," are

"double sugars," and starches contain multiple units of simple sugars, bound together in loose chemical combination. The digestion of carbohydrates reduces all of these to simple sugars.

The first important step in the breaking down of starches occurs in the mouth as the result of a ferment contained in the saliva. There are no digestive ferments in the stomach which act upon starches or sugars. So if digestion is not started in the mouth, starches pass unchanged along the digestive tract until they reach the small intestine. For this reason thorough mastication even of soft, starchy foods is important.

After digestion, sugar is absorbed directly into the blood, from which the tissue cells withdraw it according to their needs. Any excess over current needs is stored in the liver and muscles as glycogen, converted into fat or excreted through the urine. From the reserve supplies in the liver and muscles sugar is withdrawn according to the needs of the body. Then when these reserves are depleted, the body begins to burn its fats for energy.

If for any reason the amount of sugar in the blood falls below normal—a condition called "hypoglycemia"—various symptoms, such as weakness, nervousness, irritability, and a sensation of trembling, occur and eventually convulsions and death will follow unless sugar is administered.

In the tissue cells, sugar is oxidized (burned) with the aid of insulin and oxygen from the blood, and heat and energy are liberated. Just what part insulin, which is secreted by the pancreas and carried in the blood stream, plays in this oxidation of sugars is not completely understood. It is perfectly clear, however, that the body cannot burn sugar without it. The muscles may contain both sugar and oxygen, but without insulin to provide the "spark" no oxidation will occur. When the pancreas does not produce insulin in adequate amounts, the well-known disease diabetes results.

The oxygen for this burning of carbohydrates is carried from the lungs to the tissue cells by the hemoglobin of the blood. The end products of the process are carbon dioxide (carbonic acid gas) and water. The carbon dioxide is carried by the blood to

the lungs, where it is given off into the air, while the water is available for use. The chemical changes involved in the oxidation of sugar in the body are the same as when sugar is burned in a flame, except that the body can regulate the rate of burning in accordance with its energy requirements.

The need of the body for carbohydrates depends primarily upon the amount of physical activity and the quantity of other energy foods, particularly fat, available. For example, the carbohydrate intake of a person engaged in physical labor may well be 50 to 100 per cent higher than that of a person in a sedentary occupation.

As a rule carbohydrates are relatively cheap foods. Hence, when economy is an important consideration in the selection of foods, there is a tendency to increase the proportion of carbohydrate in the diet. This is entirely safe, provided the diet also contains adequate amounts of the essential minerals, proteins, and vitamins.

The chief sources of carbohydrates in the average diet are potatoes, cereal grains, sugar, and certain vegetables. Wheat contains about 70 per cent carbohydrates and is useful as a food primarily for this reason. Whole-grain cereal foods, such as breakfast foods, and bread contain more minerals and proteins than the highly milled cereals, but even these are not complete foods. Evidences of dietary deficiency are frequently found where cereals make up a major portion of the diet. The reason is not that carbohydrates are deleterious but that other essential food elements are omitted.

## The Need for Fats

Fats also are composed of the chemical elements carbon, hydrogen, and oxygen, but these exist in different proportions and combinations from those in carbohydrates. After digestion, fats are absorbed and then oxidized to produce energy, carbon dioxide, and water. Amounts in excess of current needs may be stored as body fat or converted into carbohydrate and stored as glycogen. As an energy-producing food fat is exceptionally valuable, for the oxidation of 1 gram of fat yields approximately

9 calories,[1] while 1 gram of carbohydrate or 1 gram of protein yields 4 calories.

The quantity of fat, like the quantity of carbohydrate, which should be included in the diet depends upon energy requirements and the quantity of other energy foods available. Fats of the diet are derived from both animal and vegetable sources. Among the foods with the highest fat content are vegetable oils, lard, butter, bacon, cream, nuts, and fatty meats.

## The Need for Vitamins

The discovery of the vitamins and of the part which they play in growth and health is the most important contribution of recent years to our knowledge of nutrition. On the other hand, much of the information which the public receives from commercial sources concerning vitamins is misleading. Actually, vitamins provide no heat, energy, or material for tissue building; yet they are essential for growth and health. The exact manner in which these substances influence nutrition is not known, but it is clear that minute amounts of them are adequate and that the lack of any one is deleterious to health.

The term "vitamin," which merely implies that it is something necessary for life, was adopted before the nature of vitamins was known. Several have been isolated in pure, crystalline form and their exact chemical structures determined. Some are even manufactured in the chemical laboratory. In time the nature of all vitamins probably will be known. Then the term will have lost much of its usefulness because the vitamins can be designated by the chemical names which describe their structure or nature.

The best sources of vitamins for man are natural foods of vegetable and animal origin. Occasionally it may be desirable to supplement available natural foods with vitamin concentrates. There is, however, no evidence that growth can be promoted or health improved by adding to the diet more vitamins than it is possible to obtain from the *proper selection* of natural foods.

*Vitamin A* is frequently called the "growth vitamin" or the

[1] A calorie is a unit of heat. (see p. 87).

"anti-infective vitamin." Both terms have some justification but tend to be misleading because neither is accurate. Vitamin A is essential for growth, but so also are proteins, carbohydrates, minerals, and several others of the vitamins. In animals a deficiency of vitamin A increases susceptibility to certain types of infection. On the other hand, there is no evidence that the addition of vitamin A to an average well-balanced diet will increase resistance to infection.

The most specific effects of vitamin A deficiency are night blindness—that is, difficulty in seeing with dim illumination—and a disease of the eyes called "xerophthalmia." In 1913 McCollum demonstrated that this disease of the eyes could be prevented by the addition to the diet of a substance present in butterfat, egg yolk, and other foods. He later called this substance "vitamin A." Many cases of this disease in children were observed in Denmark during the First World War. When local consumption of butterfat was increased, owing to regulations limiting exportation of dairy products, the disease disappeared. In Rumania, where the supply of dairy products was cut off, similar outbreaks of this disease were observed among children whose diets consisted largely of soups, cereals, and cereal products. The provision of cod-liver oil by the American Red Cross put an end to these outbreaks.

Other results of a deficiency of this vitamin in experiments with animals are loss of appetite, retardation of growth, physical weakness, susceptibility to infections, (particularly of the eye, respiratory tract, and middle ear), secondary anemia, failure of reproduction, and formation of kidney stones.

Vitamin A is not destroyed by ordinary cooking, by pasteurization, or by canning. It is stored by the animal organism in the liver, in milk, and in eggs, so that once an animal has taken adequate amounts of this vitamin, symptoms of deficiency will not appear for a long time even though the vitamin be completely absent from the diet.

It has been shown that in the animal body vitamin A is formed from a chemical substance, called "carotene," which is the yellow pigment of certain vegetables and plants. In the leaves

of most plants, in tomatoes, and in peas, considerable amounts of carotene also occur, although the yellow color is covered up by other pigments.

The most reliable sources of vitamin A are halibut-liver oil, cod-liver oil, egg yolk, animal fats, carrots, butter, cheese, yellow corn, sweet potatoes, squash, tomatoes, and various green leafy vegetables.

The requirements of the body for vitamin A have not been definitely established. Children need more than adults. In fact, most of the cases of xerophthalmia reported in Denmark were in children under six months of age and there were practically no cases in children over two years. No deleterious effects have been noted from the administration of excessive amounts of this vitamin. Hence, until definite information is available as to the minimum amount necessary to maintain growth and health, the diet, particularly of the growing child, should contain liberal amounts of the foods rich in this vitamin. On such a diet there is no danger of deficiency and no need to supplement the diet with special vitamin concentrates or products.

*Vitamin B.* In 1897 a Dutch physician discovered that by feeding pigeons nothing but polished rice he could produce a serious and widespread disease of the Orient called "beriberi." Having produced the disease, he found that he could cure it by adding to the diet of polished rice whole-grain cereals, milk, and certain fresh fruits and vegetables. The substance in these foods responsible for the prevention of beriberi was later named "vitamin B." Subsequent and continuing investigations have revealed that vitamin B, instead of being a single vitamin as was first believed, is really a vitamin complex consisting of at least a dozen vitamins required by the body in small amounts and several other substances of which little is known. Best understood among the constituents of the B complex are thiamin, riboflavin, and niacin.

*Thiamin,* also called vitamin $B_1$, is concerned with the proper functioning of the nervous system and with carbohydrate metabolism. The results of a deficiency are nervous irritability, impairment of the appetite, digestive disturbances, growth

failure, emaciation, weakness, anemia, impairment of lactation, multiple neuritis, and beriberi.

In this country the symptoms of $B_1$ or thiamin deficiency are usually mild. In other parts of the world, where polished rice and refined cereals are the chief articles of diet, symptoms of thiamin deficiency are much more common and severe. The amount of thiamin necessary for health is small. This normal requirement, however, is doubled during pregnancy and increases three- to fivefold during lactation. Growing children need more than adults.

The most reliable sources of this vitamin are yeast (especially brewer's yeast), whole-grain cereals, bread made from "enriched" flour, fresh fruits, eggs, vegetables, legumes, and glandular organs, such as liver, sweetbreads, and kidney. Synthetic, chemically pure thiamin is also available.

*Riboflavin* has been variously known as vitamin $B_2$ and vitamin G. Deficiency in man results in soreness of the lips, tongue, and cornea as well as vague general symptoms of ill-health. In animals shortage of riboflavin causes stunting of growth, a lowering of general physical activity, loss of hair, and premature aging of the skin. The best sources of this vitamin are yeast, milk, cheese, ice cream, meat, fish, and whole-grain or "enriched" breads or cereal products. Riboflavin also is prepared synthetically.

*Niacin* or *nicotinic acid* is the "pellagra-preventive" (P.P.) portion of the vitamin B complex. In the South, where pellagra is an important disease, particularly among the poorer classes on restricted diets, it is said that it is due to a diet of the three M's—meal (corn meal), meat (salt pork) and molasses. The late Dr. Musser of New Orleans has stated:

> It is absolutely astounding that statements are made in which it is said that pellagra is rapidly disappearing from the country. Pellagra, according to United States Public Health Service statistics for 1930, caused more deaths than all the diseases listed as communicable except pneumonia, tuberculosis and influenza.[2]

[2] Musser, J. H., "The Treatment of Pellagra," *Journal of the American Medical Association*, vol. 108, p. 974, March 20, 1937.

Deficiency of this vitamin results in weakness, growth failure, digestive disturbances, skin rashes, and probably human pellagra. Niacin has not been so effective for the prevention as it has been for the treatment of pellagra. Hence, for prevention an adequate diet rather than the addition of niacin to the diet is recommended. Foods rich in the pellagra-preventive factor are yeast, liver, lean meat, milk, eggs, fish, wheat germ, and green vegetables. There is no possibility of a deficiency if one is on any reasonably balanced diet.

Among the other components of the B complex are *pyridoxine* (vitamin $B_6$), which has been tried with some apparent success in the treatment of certain types of anemia, muscular dystrophy, and neuritis, but no definite conclusions can yet be drawn as to its value; *pantothenic acid*, which seems to be necessary for normal growth of yeasts, many bacteria, and certain animals; *choline*, which plays an important role in the nutrition of several different animals; and vitamin $B_{12}$, which has been found effective in the treatment of pernicious anemia.

*Vitamin C* is called the "antiscorbutic vitamin" because its absence results in a disease called "scurvy." Adult scurvy, although rarely seen today, used to be very common, particularly among soldiers, sailors, and others cut off from regular supplies of fresh fruit. Infantile scurvy, which is said to be preeminently a disorder of modern times, is due largely to artificial feeding and to the use of commercially prepared foods for infants.

> Almost all our domestic animals and household pets are more fortunately situated than we are with respect to vitamin C. They do not need dietary supplies, because they make the vitamin in their own bodies, out of what and by what process we do not yet know. There is evidence that we can store enough vitamin C to last a few months if need be, although we would probably know something was the matter before that time was terminated.[3]

Within the past few years vitamin C has been isolated in pure crystalline form and upon chemical analysis found to be hexuronic, or so-called "ascorbic acid." This may be prepared from adrenal glands, citrus fruits, cabbage, paprika, and other plant

[3] Palmer, L. S., "The Fundamentals of Nutrition," *Journal-Lancet*, vol. 58, pp. 219–223, May, 1938.

materials. Recently it also has been prepared synthetically in the laboratory.

The results of a deficiency of vitamin C in experiments with animals are lowered vitality, growth failure, capillary degeneration, spongy bleeding gums, anemia, hemorrhage, dental defects, fragility of the bones, degeneration of various organs, secondary infections, and scurvy.

Vitamin C is rapidly destroyed by oxidation. Heat accelerates the rate of oxidation and so hastens its destruction. Hence, pasteurized and boiled milk contain less vitamin C than raw milk. Cooking and canning reduce the vitamin C content of foods. The exclusion of air and the presence of salts or acids in cooking or canning reduce the rate of oxidation and so minimize the destruction of vitamin C.

The most dependable sources of this vitamin are fruits, tubers, and leaves. Lemon juice is the richest common source of vitamin C. Orange juice and grapefruit juice rank next, while tomato juice contains approximately half as much as does orange juice. Leafy vegetables also are rich sources of this nutritional factor. And potatoes, even when cooked, contain enough of this vitamin to afford some practical protection during the winter months.

*Vitamin D* is called the "antirachitic vitamin" because its absence from the diets of infants results in the disease rickets. Although rickets is usually considered a disease of the bones, because of the skeletal deformities which accompany it, it actually is a nutritional disease which affects the entire organism. The rachitic child is irritable, weak, restless, anemic, flabby, and susceptible to infections. The nervous manifestations seem to be due to a disturbance of calcium metabolism, while both calcium and phosphorus are involved in the faulty development of the bones. The function of vitamin D is to regulate the utilization of these minerals.

Another disease of children that is related to calcium metabolism and vitamin D is tetany. The symptoms of this disease, which involves also the parathyroid gland, are restlessness and intermittent or continuous contraction of certain groups of muscles, most frequently those of the neck, legs, and lower back.

The results of deficiency of this vitamin are muscular weakness, instability of the nervous system, enamel defects of the teeth, rickets, and possibly dental caries.

The distribution of vitamin D in nature is extremely limited. Egg yolk is its chief source in the average diet. Milk and dairy products contain very little. The flesh of certain fish, particularly herring and salmon, contain considerable quantities, but the richest known source in nature is cod-liver oil.

For some years there was considerable confusion concerning the relation of this vitamin to rickets because it could be demonstrated that exposure to sunlight or ultraviolet light also would prevent or cure this disease. This apparent paradox was explained when it was discovered that the irradiation of certain oils, called "sterols," resulted in the formation of vitamin D. These sterols are present in certain oils, foods, and animal tissues, including the skin. Exposure of these to ultraviolet light produces vitamin D. Viosterol, an irradiated sterol, is the richest concentrate of vitamin D.

Just how much of this vitamin is necessary to maintain health we do not know, but it is clear that infants and growing children need a liberal supply of it. It has been estimated by some physicians that 50 to 75 per cent of the children of this country suffer some impairment of health as a result of an inadequate supply of vitamin D. Adults apparently need but little, but the nutritional status even of some adults probably would be improved by more liberal quantities of this vitamin in the diet.

Of all the vitamins, D is most likely to be deficient in the average well-balanced diet, at least during the winter, when but little ultraviolet radiation from the sun reaches the earth. During this period, October to April, cod-liver oil, a liberal number of eggs, or irradiated or vitamin-enriched milk should be included in the diet of children.

*Vitamin E* is concerned with the reproductive processes and functions. Its absence leads to sterility, muscular weakness, and, in the young, paralysis. It is found chiefly in whole-grain cereals, green vegetables, muscles, and glandular organs. Although a German physician reported that he had successfully treated

seventeen out of twenty cases of habitual abortion with wheat-germ oil, there is little evidence that deficiency of this vitamin is a widespread problem as far as human health is concerned.

> *Vitamin K* until recently was not regarded as important for human welfare. This vitamin is essential for the formation of certain blood clotting principles and is thus concerned with blood coagulation. The vitamin appears to be formed in the digestive tract under normal conditions so that dietary supplies normally are not necessary. . . .
>
> *Vitamin P*, a newly discovered vitamin which accompanies vitamin C in nature, is concerned with some of the changes which occur in the blood vessels in scurvy, particularly with their fragility.[4]

*Other vitamins*, or vitaminlike substances, recently announced are vitamin L, which is essential to the proper lactation of rats; vitamin T, which is concerned with the formation of blood platelets; a "grass juice factor," which influences the rate of growth of rats; and a "gizzard erosion factor," the absence of which results in the development of ulcers in the lining of the gizzards of chicks. The importance of these in human nutrition is yet to be determined.

## READING SUGGESTIONS

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3. Rose, Mary S.: "The Foundations of Nutrition," 4th ed., The Macmillan Company, New York, 1944.
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[4] *Ibid.*

# Chapter V

# THE CHOICE OF FOODS

With an understanding of the nutritional requirements of the body, the next question is how one can make the best practical selection of foods to meet these requirements. Proteins, mineral salts, and vitamins may be essential, but what shall we eat, and how much of it? Nutritional requirements vary so much, even for persons of the same sex, age, and size, that a single answer to this question is impossible. Growing children need more proteins, minerals, and vitamins than do adults; persons who are physically active need more energy foods than do those who lead a sedentary life; the same individuals need more heat-producing foods in winter than in summer. Furthermore, the quantity of certain foods in the diet modifies the requirement for others; for example, if the diet contains plenty of carbohydrate and fat, the protein may be reduced to a minimum.

## Basic Food Requirements

The family's food supply holds great potentialities for the improvement of the health of the individual, the family, and society as a whole. Studies by the U.S. Public Health Service indicate that more than one-third of American families subsist on diets which would not be rated as better than "poor" by accepted standards. Intelligent choice and use of foods, the

formation of good food habits, and the use of the food budget to provide the best possible diet for the family are an important part of a health program.

The problem of health and nutrition begins with the pregnant woman in the nine months before the birth of her infant. Foods adequate in kind and amount during these months are of prime importance to the health of both present and future generations. Nearly everyone appreciates the importance of food to the infant and growing child. Children whose diets are inadequate do not grow and develop normally. The responsibility of both the home and the school in providing and teaching good food habits to children at an early age is of paramount importance in building good health. The maintenance of positive health through a continuation of these good food habits all during life constitutes one of the newer and important phases of health education.

There are certain basic requirements for every diet whether it be for one who is old or young, large or small, active or inactive. These are water, vitamins, proteins, and inorganic salts. Thirst is a safe guide as to the amount of water which is necessary. Vitamins are essential but fresh fruits, leafy vegetables, whole-grain cereals and whole-wheat flour, butter, milk, and eggs, with cod-liver oil for infants and growing children, can be relied upon to provide adequate protection against vitamin deficiency.

The requirements for mineral salts—calcium, phosphorus, iron, copper, etc.—are supplied by milk, eggs, meat, fresh fruits, and vegetables. In sections of the country removed from the seacoast it may be necessary to add iodine in some convenient form.

Proteins must be provided in sufficient quantities to supply the body's needs for growth and tissue repair. The smallest amount which will meet this requirement is approximately two calories of protein per day for each pound of normal body weight. In order that there may be a margin of safety, somewhat larger quantities are usually recommended. Meat once a day, in addition to eggs, milk, and vegetables, will adequately supply this need.

In addition to these basic food requirements the energy needs of the body must be supplied. Proteins can be utilized for this purpose, but foods rich in carbohydrates and fats are more satisfactory and more economical as energy-producing foods (see Appendix C).

## Milk—The Perfect Food

Milk is nature's most nearly perfect food. Although deficient in iron and copper, it contains relatively large amounts of calcium and phosphorus, an assortment of other important mineral elements, several proteins of excellent quality, a rich supply of vitamins A and B, and an appreciable amount of vitamin D. Enriched milk contains added quantities of vitamin D and sometimes of vitamin A. Such a complete food is rightly considered the most valuable single food product available.

The quantity of milk which can profitably be included in the diet has been estimated as not less than a quart per day. This includes the milk taken as drink or beverage and that used in the preparation of cereals, soups, vegetables, desserts, bakery products, etc. In the diets of children from one to five years of age a quart of milk will constitute from 40 to 70 per cent of the total food requirement. In a child of fourteen this same quantity of milk will supply only about 25 per cent of the needs. In the diets of adults there is less necessity for milk, but in any age group milk and milk products, such as butter and cheese, provide certain nutritive elements which may be lacking in other foods.

Skimmed milk contains just as much protein and calcium as whole milk but less vitamin A. Most of the vitamin A, being soluble in fat, is removed with the cream. If skimmed milk is used, some other sources of vitamin A, such as enriched foods, cod-liver oil, and vegetables rich in vitamin A should be included in the diet.

## Cereal Grains—Inexpensive Foods

Plants store reserve supplies of food in their seeds for the nourishment of the young plants after the seeds have germi-

nated. Man utilizes this rich source of energy as food for himself and his domestic animals.

Cereal grains and the food products, such as bread, derived from them make up a large proportion of the American diet. They are valuable primarily because they constitute inexpensive, easily digestible sources of energy. These grains consist largely of starch, but in addition they contain small amounts of protein and, if their outer coats are retained, certain minerals and vitamins.

Foods derived from cereal grains may safely constitute up to 30 per cent of the total energy requirements. With increased activity the relative as well as the actual cereal content of the diet may well be increased. When economy is an important consideration, the cereal grains may be freely used. However, if they make up more than 15 per cent of the total energy value, that is, the calories of the diet, attention should be given to the liberal use of other foods such as spinach, cabbage, lettuce, and whole-grain cereals, for their mineral and vitamin content.

## Fruits and Vegetables—Essential Foods

Because of their mineral and vitamin content, fruits and vegetables should constitute not less than 15 to 20 per cent of the diet. If not limited by cost, this proportion may well be increased to 25 per cent.

Oranges and tomatoes are the fresh fruits of greatest value; but all fruits and green leafy vegetables are of importance. The practice of regularly eating some raw fruit or vegetable is very desirable. Potatoes, which are usually inexpensive, provide not only an excellent source of energy but also several mineral elements and vitamins B and C. The physical endurance at hard labor of a man who had been on an experimental diet of only potatoes and butter for several months was found to be greater than that of other laborers on ordinary diets. Potatoes are especially valuable for children and for people doing muscular work. The legendary health merit of the apple has received some scientific support through a study showing it to be of value as a home remedy for diarrhea in children.

The skins of vegetables contain valuable minerals and vitamins and should be eaten whenever convenient. In cooking, many of the minerals and vitamins go into solution; hence, vegetables should be cooked in as little water as possible and this water utilized.

## Eggs and Meat—Expensive but Necessary

Eggs are such a rich source of several minerals and vitamins that they should be used liberally in the diet. Children need three or four eggs a week or, better still, an egg a day.

Although meat is appetizing and rich in proteins, phosphorus, and iron, it is an expensive source of energy and is deficient in other minerals and vitamins. Many dietitians consider meat a luxury food to be used as supplementary to milk, eggs, butter, fruits, vegetables, and cereals. Liver is an unusually rich source of vitamins A and B and of iron and is a specific remedy for the treatment of the formerly fatal disease pernicious anemia.

Certain religious sects and dietary faddists consider meat deleterious and so taboo it entirely. Dietitians usually limit its use to moderate amounts, because meat and protein foods are expensive sources of energy. Some physicians believe that proteins favor intestinal putrefaction; but the consensus of medical opinion is that meats moderately in excess of protein requirements are not harmful to the normal person. If high blood pressure or kidney disease exists, the advice of a physician concerning diet should be followed.

## Fats—A Rich Source of Energy

Fats are useful in the body primarily as sources of energy and should be increased or decreased according to energy requirements. In infancy fats are not easily digested but after the age of six they may well supply from 10 to 20 per cent of the total energy requirements.

Cod-liver oil, which contains both vitamins A and D, probably has the greatest nutritional value of any of the fats but can hardly be considered in the category of a regular food. Butter and cream not only contain fat but are among the best sources

of vitamin A. Most nuts are rich in fat and are good sources of vitamin B. On the other hand, the nutritional value of most other animal and vegetable fats such as bacon, lard, suet, olive oil, and oleomargarine, unless "enriched," depends entirely upon the energy which they supply.

## Sugar—Easily Available Energy

Sugars are useful in the diet only as a source of energy and as a means of improving the palatability of foods. Students of nutrition recommend that sugar be used sparingly in the diet because it tends to dull the appetite for foods which contain other nutritional elements. Most children on adequate, well-selected diets do not crave sweets. Sugars provide easily available energy, but even for this purpose foods which also supply other nutritional factors are to be preferred.

## Protective Foods

As scientific investigation indicated the basic nutritional needs of the body, Dr. E. V. McCollum of Johns Hopkins University, pioneer scientist in nutrition, applied the term "protective foods" to those foods which represent the richest sources of these basic nutritional needs. These are milk, milk products, eggs, fruits, and leafy vegetables.

Dr. H. C. Sherman, professor of chemistry at Columbia University and eminent authority on nutrition, reported that it is possible to defer senility and to increase the average length of life of rats by approximately 10 per cent simply by increasing the proportion of protective foods in their diets.

## Enriched Foods

The refining of food products, which the public has come to demand, has had unfortunate effects upon the adequacy of the modern diet. Most serious among these are the loss of important food elements in the milling of white flour and other cereal grains and the substitution of sugar for other sources of energy. White flour contains only one-tenth to one-fifth as much thiamin as does whole wheat, and sugar contains no vitamins at all. Re-

ports show that the parish poor in England in 1839 probably received about 650 to 850 international units of vitamin $B_1$ daily; one hundred years later supposedly good diets of persons in moderate circumstances supplied only about 450 to 550 units of this vitamin daily.

The best remedy for this situation would be to return to the use of whole-wheat flours and cereals. Unfortunately it is exceedingly difficult to convince the public that it should change its eating habits. Realizing this, authorities concerned with the nutrition of the nation have induced the milling industry of the country to "enrich" white flour by adding to it the approximate amounts of thiamin, riboflavin, and nicotinic acid which are removed in the milling process. Many mills are also adding calcium, phosphorus, and iron to their flours.

The soundness of this practice is obvious, and when enriched flour becomes widely distributed and universally accepted it should make a material contribution to the national health.

Another "enriched" food which has been accepted by nutrition authorities is vitamin D milk. This is not a case of supplying a vitamin that has been removed from the diet but merely a convenient and inexpensive means of supplying the body's needs for vitamin D. Milk may be enriched with vitamin D either by exposure to ultraviolet light or by the addition of a cod-liver oil concentrate. The latter provides vitamin A as well as vitamin D, but either method is satisfactory.

The irradiation of certain other foods, such as cereals, increases their vitamin D content but none of these is so satisfactory a vehicle as milk for supplying the vitamin D requirements of the body. In fact many advertised vitamin products and concentrates represent nothing more than the efforts of advertisers to exploit for their own profit the public interest in nutrition.

## The Digestibility of Foods

Foods are frequently considered indigestible if they produce a sensation of fullness for a considerable time after eating. This is a reflection of the rate at which foods pass out of the stomach and is not necessarily related to the ultimate nutritional value

derived from them. Starches leave the stomach more rapidly than proteins, and proteins more rapidly than fats, while mixtures of proteins and fats remain in the stomach longer than either of these foods alone.

The preparation of food apparently has less influence upon digestibility than is generally believed, for careful studies have shown that fried potatoes, unless they have absorbed a great deal of fat, leave the stomach just as promptly and are just as digestible as boiled, baked, or mashed potatoes.

## Energy Requirements

In the planning of a diet, energy requirements as well as basic essentials need to be considered. These are usually expressed in units of heat, called "calories," a calorie being the amount of heat necessary to raise the temperature of 1 litre of water 1 degree centigrade, or 1 quart of water $1\frac{5}{8}$ degrees Fahrenheit. The energy values of various foods have been determined in terms of calories and it has been found that 1 gram ($\frac{1}{30}$ ounce) of protein or of carbohydrate will yield 4 calories of heat and that 1 gram of fat will yield 9 calories.

Energy requirements vary with age, size, sex, activity, foods to be digested, clothing, temperature of the body and of the surrounding atmosphere, functioning of certain glands of internal secretion, etc. Hence, it is difficult to state exactly how much energy-producing food the body needs. It is possible, however, to estimate with reasonable accuracy the energy requirements of a normal person of a given size at complete rest. This is called the "basal metabolism." In terms of calories this basal requirement for a 24-hour period has been found to be about 11 calories per pound of ideal weight, that is, 11 calories per pound of what one should weigh for one's age and height. The slight activity of a person in bed increases the requirement about 10 per cent. Walking uses up about a calorie per pound of body weight per hour. Table 4 shows the relative amounts of energy expended per day by men and women in various occupations.

An adult who is up and about, but relatively inactive, needs 20 to 30 per cent more calories than are required under basal

TABLE 4

RECOMMENDED DAILY DIETARY ALLOWANCES,[1] REVISED 1948*

(Food and Nutrition Board, National Research Council)

| | Calories[2] | Protein, Gm. | Calcium, Gm. | Iron, Mg. | Vitamin A,[3] I.U. | Thiamine,[4] Mg. | Riboflavin,[4] Mg. | Niacin (Nicotinic Acid),[4] Mg. | Ascorbic Acid, Mg. | Vitamin D, I.U. |
|---|---|---|---|---|---|---|---|---|---|---|
| **Man (154 lb., 70 kg.)** | | | | | | | | | | |
| **Sedentary** | 2400 | 70 | 1.0 | 12[5] | 5000 | 1.2 | 1.8 | 12 | 75 | [6] |
| **Physically active** | 3000 | 70 | 1.0 | 12[5] | 5000 | 1.5 | 1.8 | 15 | 75 | [6] |
| **With heavy work** | 4500 | 70 | 1.0 | 12[5] | 5000 | 1.8 | 1.8 | 18 | 75 | [6] |
| **Woman (123 lb., 56 kg)** | | | | | | | | | | |
| **Sedentary** | 2000 | 60 | 1.0 | 12 | 5000 | 1.0 | 1.5 | 10 | 70 | [6] |
| **Moderately active** | 2400 | 60 | 1.0 | 12 | 5000 | 1.2 | 1.5 | 12 | 70 | [6] |
| **Very active** | 3000 | 60 | 1.0 | 12 | 5000 | 1.5 | 1.5 | 15 | 70 | [6] |
| **Pregnancy (latter half)** | 2400[7] | 85 | 1.5 | 15 | 6000 | 1.5 | 2.5 | 15 | 100 | 400 |
| **Lactation** | 3000 | 100 | 2.0 | 15 | 8000 | 1.5 | 3.0 | 15 | 150 | 400 |
| **Children up to 12 yrs.[8]** | | | | | | | | | | |
| **Under 1 yr.[9]** | 110/2.2 lb. (1 kg.) | 3.5/2.2 lb. (1 kg.) | 1.0 | 6 | 1500 | 0.4 | 0.6 | 4 | 30 | 400 |
| **1–3 yrs. (27 lb., 12 kg.)** | 1200 | 40 | 1.0 | 7 | 2000 | 0.6 | 0.9 | 6 | 35 | 400 |
| **4–6 yrs. (42 lb., 19 kg.)** | 1600 | 50 | 1.0 | 8 | 2500 | 0.8 | 1.2 | 8 | 50 | 400 |
| **7–9 yrs. (58 lb., 26 kg.)** | 2000 | 60 | 1.0 | 10 | 3500 | 1.0 | 1.5 | 10 | 60 | 400 |
| **10–12 yrs. (78 lb., 35 kg.)** | 2500 | 70 | 1.2 | 12 | 4500 | 1.2 | 1.8 | 12 | 75 | 400 |
| **Children over 12 yrs.[8]** | | | | | | | | | | |
| **Girls, 13–15 yrs. (108 lb., 49 kg.)** | 2600 | 80 | 1.3 | 15 | 5000 | 1.3 | 2.0 | 13 | 80 | 400 |
| **16–20 yrs. (122 lb., 55 kg.)** | 2400 | 75 | 1.0 | 15 | 5000 | 1.2 | 1.8 | 12 | 80 | 400 |
| **Boys, 13–15 yrs. (108 lb., 49 kg.)** | 3200 | 85 | 1.4 | 15 | 5000 | 1.5 | 2.0 | 15 | 90 | 400 |
| **16–20 yrs. (141 lb., 64 kg.)** | 3800 | 100 | 1.4 | 15 | 6000 | 1.7 | 2.5 | 17 | 100 | 400 |

[1] Objectives toward which to aim in planning practical dietaries: The recommended allowances can be attained with a good variety of common foods which will also provide other minerals and vitamins for which requirements are less well known.

[2] Calorie allowances must be adjusted up or down to meet specific needs. The calorie values in the table are therefore not applicable to all individuals but rather represent group averages. The proper calorie allowance is that which over an extended period will maintain body weight or rate of growth at the level most conducive to well-being.

[3] The allowance depends on the relative amounts of vitamin A and carotene. The allowances of the table are based on the premise that approximately two-thirds of the vitamin A value of the average diet in this country is contributed by carotene and that carotene has half or less than half the value of vitamin A.

[4] For adults (except pregnant and lactating women) receiving diets supplying 2000 calories or less, such as reducing diets, the allowances of thiamine and niacin may be 1 mg. and 10 mg. respectively. The fact that figures are given for different calorie levels for thiamine and niacin does not imply that we can estimate the requirement of these factors within 500 calories, but they are added merely for simplicity of calculation. In the present revision, riboflavin allowances are based on body weight rather than caloric levels. Other members of the B complex also are required, though no values can be given. Foods supplying adequate thiamine, riboflavin, and niacin will tend to supply sufficient of the remaining B vitamins.

[5] There is evidence that the male adult needs relatively little iron. The need will usually be provided for if the diet is satisfactory in other respects.

[6] The need for supplemental vitamin D by vigorous adults leading a normal life seems to be minimum. For persons working at night and for nuns and others whose habits shield them from the sunlight, as well as for elderly persons, the ingestion of small amounts of vitamin D is desirable.

[7] During the latter part of pregnancy the calorie allowance should increase to approximately 20 per cent above the preceding level. The value of 2400 calories represents the allowance for pregnant, sedentary women.

[8] Allowances for children are based on the needs for the middle year in each group (as 2, 5, 8, etc.) and are for moderate activity and for average weight at the middle year of the age group.

[9] Needs for infants increase from month to month with size and activity. The amounts given are for approximately 6 to 8 months. The dietary requirements for some of the nutrients such as protein and calcium are less if derived largely from human milk.

* From National Research Council Reprint and Circular Series, Number 129, October, 1948, Washington, D.C.

conditions. For one engaged in a sedentary occupation, this extra energy requirement rises to from 30 to 40 per cent above basal; for one in moderately active muscular work, 40 to 80 per cent; and for one at hard muscular work, 80 to 200 per cent.

These are only approximations of energy requirements, but they provide a workable and reasonably satisfactory method of estimating what an individual's energy intake should be. For example, the energy requirement of a man in a sedentary occupation who takes little exercise, and whose normal weight, according to age and height, is 160 pounds, is computed as follows: the basic energy requirement for a person weighing 160 pounds is 11 times 160, or 1,760 calories. Since the subject leads a relatively sedentary life, this requirement is increased by approximately 35 per cent, or 2,376 calories. In a similar manner, the approximate energy requirement for any adult may be estimated.

*Energy Requirements of Children.* The rate of growth and the physical activity of children vary so much that it is difficult to approximate their energy requirements. Nutrition workers state that the best evidence that the nutritional requirements of children are being properly met is that they grow properly, feel well, sleep quietly, are mentally and physically active and not nervous. Give children each day an egg, three glasses of milk, some fresh fruit, two kinds of vegetables and all the bread, butter, and potatoes they want, and there is little danger of inadequate nutrition.

*Energy Expenditure Decreases with Age.* The basic food requirements are essentially the same at every age but energy-producing foods should be reduced in accordance with the diminishing energy expenditure. The great dangers which accompany overweight with advancing age make it important that this be done before excess weight develops.

## General Recommendations Concerning Diet

The Advisory Committee of the British Ministry of Health reported:

**. . . the changes in the diet of the people which in the opinon of the Advisory Committee appear desirable . . . may be summed up in the words: more**

protective foods; more milk, more fresh vegetables and fruit, more eggs, more potatoes. And in view of the committee's general agreement with the recommendations of the Technical Commission of the League of Nations there may be added to these changes: Less sugar, less white flour, and more lightly milled cereals.[1]

*College Students' Meals.* Observation of the meals which college students choose at cafeterias and restaurants is convincing evidence that many of them are either ignorant or negligent of their essential food requirements. Meat, potatoes, bread, coffee, and pie will supply calories but in time lack of energy, fatigue, nervousness, and other indefinite symptoms will reduce the individual's level of health and efficiency.

A student's daily food intake should include at least two glasses of milk or the equivalent in milk products; two squares of butter; one egg; one serving of meat or fish (cheese or legumes may be substituted twice a week); one raw orange, grapefruit, or tomato and one other fruit, raw or cooked; two servings of vegetables—besides potatoes—one of which should be leafy, raw, and green or yellow; some whole-grain cereal; and "enriched" or whole-wheat bread. The rest of one's food can safely be selected according to taste (see Table 5).

For students whose food budgets are exceedingly limited substitutions in these diets such as those shown in Table 6 may be made with safety (see Appendix C).

## Normal Weight

The experience of life insurance companies indicates that, as a group, individuals of average weight (see Appendix A), commonly called "normal weight," have a favorable mortality; but the mortality among persons of weights above or below normal is strikingly excessive. Under forty-five years of age the hazard of overweight is relatively less than in later life, but, all ages taken together, overweights have a mortality nearly 40 per cent greater than persons of normal weight. A moderate degree of underweight is apparently advantageous, particularly in the older age groups.

[1] Ministry of Health, Advisory Committee on Nutrition, *First Report*, H. M. Stationery Office, London, 1937.

TABLE 5

SAMPLE MENUS OF MODERATE PRICE*

(Approximately 2,500 calories and adequate protective foods, proteins, minerals, and vitamins—standard portions)

| 1 | 2 | 3 |
|---|---|---|
| **Breakfast** | **Breakfast** | **Breakfast** |
| Fruit in season | Canned or cooked fruit | Orange or grapefruit or tomato juice |
| Whole-grain cereal | Whole-grain cereal | Whole-grain cereal |
| Top milk | Top milk | Top milk |
| Sugar | Sugar | Sugar |
| Egg | Bacon (2 slices) | Waffles or griddle cakes |
| Whole-wheat rolls | Whole-wheat toast | Sirup or honey |
| Butter | Butter | Butter |
| Coffee | Cocoa | Milk |
| Cream | | |
| Sugar | | |
| **Lunch** | **Lunch** | **Lunch** |
| Cream of vegetable soup | Cream of vegetable soup | Hash with poached egg |
| Cracker | Cracker | Whole-wheat bread |
| Spanish spaghetti with ground meat or macaroni and cheese | Meat ball† | Butter |
| Whole-wheat bread | Baked potato | Green vegetable salad |
| Butter | Whole-wheat bread | Ice cream, sugar cooky |
| Lettuce salad | Butter | Coffee |
| Gingerbread | Orange, grapefruit, or tomato salad | Cream |
| Milk | Cake | Sugar |
| | Tea or coffee | |
| **Dinner** | **Dinner** | **Dinner** |
| Liver and bacon or roast lamb, mint sauce† | Tomato bouillon | Cream lima bean soup |
| Parsley potatoes | Cracker | Cracker |
| Peas in milk | Cubed steak† | Roast beef† |
| Green vegetable salad | Mashed potato | Stuffed potato |
| Whole-wheat bread | String beans | Buttered carrots |
| Butter | Celery and carrot strips | Watercress salad |
| Fruit pie | Whole-wheat bread | Whole-wheat bread |
| Beverage‡ | Butter | Butter |
| | Raisin custard bread pudding | Apple crisp or fruit cobbler |
| | Beverage‡ | Beverage‡ |

* The menus have been suggested by Miss Gertrude Thomas, Director of Nutrition, University of Minnesota Hospital.

† Occasionally sea food.

‡ Preferably milk.

The only disease which produces an excessively high mortality among the underweights is tuberculosis. Overweight, on the other hand, is associated with an excessive mortality from diabetes, angina pectoris, diseases of the arteries, Bright's disease

TABLE 6

LOW-COST SUBSTITUTES IN SAMPLE MENUS*

| For Canned Fruit | For Luncheon Meat | |
|---|---|---|
| Prunes | Macaroni and cheese | Spaghetti and cheese |
| Apricots | Cheese sandwich | Asparagus with cheese sauce |
| Dried peaches | Baked rarebit | Creamed chipped beef on toast |
| Dried apples | Baked noodles and cheese | Escalloped potatoes and dried beef |
| | Cheese soufflé | Escalloped potatoes and cheese |
| | Creamed eggs and cheese | Welsh rarebit on rice |
| | Creamed eggs on toast | |
| | Rice and cheese | |
| **For Roast Beef or Steak** | **For Vegetables, Peas, Beans, etc.** | |
| Cubed steak | Rutabagas | Beets |
| Swiss steak | Cabbage | Squash (in season) |
| Meat balls | Carrots | |
| Pot roast | Turnips | |
| Meat pie | Parsnips | |
| Meat stew | Onions | |
| **For Lettuce Salad** | **For Desserts** | |
| Celery and/or carrot sticks | Bread pudding with raisins | Apple Betty |
| Cucumber, cabbage salad | Bread pudding with dates | Applesauce, other apple desserts |
| Celery, cabbage | Corn-meal pudding with molasses | In season: |
| Combination salad (lettuce, radish, cucumber, green pepper, in season) | Indian pudding | Bananas |
| Combination salad (lettuce, carrots, cauliflower) | Tapioca pudding with raisins | Prune desserts |
| | Tapioca pudding with dates | Rhubarb |
| | Blancmange with raisins | Watermelon and other low-cost fruits in or as desserts |
| | Blancmange with dates | |

* Suggested by Miss Gertrude Thomas, Director of Nutrition, University of Minnesota Hospital.

(nephritis), cerebral hemorrhage and apoplexy, organic diseases of the heart, and cirrhosis of the liver. To a somewhat less degree, it is associated with cancer, appendicitis, typhoid fever, and paralysis. The more important of these are degenerative diseases which represent the results of excessive wear and tear upon the system.

## Underweight

We have seen that underweight in young persons is associated with high mortality, particularly from tuberculosis. Whatever the cause of the relationship, there can be no doubt that underweight is associated with tuberculosis. Hence, it would seem that gain in weight should be encouraged among young underweight persons as a form of insurance against this disease. However, if the weight gain is carried beyond the normal for the age and height, the increased risk from degenerative diseases more than offsets the advantage gained from the greater protection against tuberculosis.

Underweight increases the susceptibility to fatigue and nervousness as well as to organic disease. Fortunately, the fad of being thin is on the decline, and many girls and young women are finding that they have more energy and feel better with a little more weight.

Underweight may result from improper eating habits, inadequate food, functional disturbances of the body, or actual disease. If the basic cause is disease, the underweight may be a valuable first symptom. Hence, the only intelligent way to start on a program for gaining weight is to have a thorough physical examination. If the underweight is found to be a dietary problem, there are two general principles to be followed to gain weight: One is to eat more food, particularly of high caloric value; the other to use up less energy.

### HOW TO GAIN WEIGHT

Probably 90 per cent of healthy people can gain weight simply by eating more food. At first they doubt this because they consider themselves hearty eaters, but if they keep a record of their diets over a period of several days and determine what their energy intakes amount to, they are amazed to find that they are not consuming enough food to maintain weight.

In order to gain weight the energy (caloric) intake must be raised so that it exceeds the energy expenditure. A moderately active individual of average size uses up about 2,500 calories

per day. In order to gain weight a diet of 3,000 to 4,000 calories should be provided. The practical problem is to provide the necessary calories in the most appetizing and digestible form.

Fat yields more energy, weight for weight, than any of the other foods, but carbohydrates are the most easily converted into body fat. Proteins are the least efficient foods for this purpose.

A quart of whole milk a day not only furnishes about 700 calories but supplies the requirements for calcium, phosphorus, and vitamin A. Butter, cream, fatty meats, cheese, mayonnaise and boiled salad dressing, cream soups, pies, custards, ice cream, and similar foods have high caloric value. An egg drink once a day between meals is valuable for its mineral and vitamin content, as well as to supply additional calories. Fresh fruits and vegetables contain the valuable vitamin C and stimulate the appetite.

In order to gain a pound a week the diet must be increased by approximately 600 calories per day. The support of greater weight, however, requires greater energy expenditure, so for continued gain the diet must be increased still more.

Many underweight persons complain of insufficient appetite. In such cases an effort should be made to increase the appetite by the selection of delectable foods, the taking of orange juice between meals, moderate exercise in the fresh air, and occasionally by the use of tonics or insulin.

Lack of appetite does not seriously interfere with the nutritional value of food, so a person who is trying to gain in weight should eat more food than is necessary to provide a feeling of satisfaction. The difficulty of a limited capacity may be overcome also by partaking of foods more frequently than three times a day. An extra meal at bedtime is recommended for gaining weight because it increases food intake without impairing the appetite, while lunches in the morning and in the afternoon reduce the amount of food eaten at the regular meals.

More hours of sleep at night and rest periods after lunch and dinner are valuable adjuncts to diet in an effort to gain weight.

## Overweight

The records of every life insurance company show conclusively that obesity is a liability to health and that the hazard of excessive weight increases with age and with the degree of overweight. A simple but impressive way of expressing this is the old rule-of-thumb adage "for every inch by which a man's waist measure exceeds his chest measure, subtract two years from his life expectation."

The diseases responsible for the high mortality of overweight people are largely metabolic and degenerative—diabetes, heart disease, apoplexy, Bright's disease, and cirrhosis of the liver. Overweight seems to be related to these diseases primarily because it interferes with metabolism and throws a greater strain upon the circulatory system. It has been estimated that for each 5 pounds of excess weight the blood vessels are increased by 3 miles.

The causes of obesity may be divided into the hereditary, dietary, and glandular groups. Just how heredity influences obesity is not entirely clear, but there is much to suggest that it is through the nervous control of metabolism and appetite. The dietary type of obesity merely means that food intake exceeds the energy expenditure of the body. This may be due to habit or the indulgence of appetite. Both dietary and hereditary types, therefore, are susceptible to control through dietary measures.

In the glandular type of obesity, there is a lowered expenditure of energy because of diminished activity of certain of the glands of internal secretion, usually the thyroid and the pituitary. In such cases fat accumulates even with a normal intake of food. The treatment of this type of obesity is a strictly medical problem.

The "cure" of obesity is one of the richest fields for medical swindlers. The wares which they have to sell, all guaranteed to cure, include elastic belts, corsets, vibrating and exercising machines, reducing foods, bath salts, soaps, creams, and drugs for internal medication.

Medicinal preparations advertised for the reduction of weight are either worthless or dangerous. Many contain laxatives which cause a temporary reduction of weight by loss of water. Some contain iodine but this has no effect upon weight except in persons with goiters, and it is dangerous for such persons to take iodine without medical supervision. Many reducing medicines contain dried thyroid extract. This in sufficient quantities increases the rate of metabolism and thus may cause some loss of weight. However, excessive thyroid stimulation is accompanied by nervousness, irritability, and other unpleasant symptoms, and it may produce serious ill effects.

### EXERCISE FOR THE REDUCTION OF WEIGHT

Exercise is vastly overrated for the reduction of weight, for under ordinary conditions it is necessary to walk about 36 miles to get rid of 1 pound of fat. Yet, exercise can be a valuable aid in the treatment of obesity, provided it is used with discretion and in conjunction with dietary measures. Discretion is necessary because excessive fat throws a heavy load upon the heart and circulatory system, and it may be dangerous to increase this still more by strenuous exercise. Another disadvantage of exercise is that it increases the appetite and so makes food restriction more difficult. Moderate general exercise, such as walking, and calisthenics which exercise the muscles of the abdomen and back are useful to give a feeling of well-being and to increase the tone of the tissues. It is unwise, however, for the person over forty to carry these exercises to the point of exhaustion or shortness of breath.

Weight can be reduced several pounds by sweating because of the loss of water from the body. This loss, however, is rapidly regained as one takes in fluids to meet the body's needs.

### THE DIETARY CONTROL OF WEIGHT

The dietary control of food intake is the one safe and effective method of reducing weight. The principle involved is simply that of keeping the energy intake below the energy expenditure of the

body. Fat is the body's chief storehouse of excess energy. When more energy is taken in as food than the body can use, some of it, but a relatively small amount, is stored as glycogen (carbohydrate). The rest, whether it be from carbohydrate, fat, or protein in the food, is converted into body fat. The amount of glycogen which the body can store will provide scarcely enough energy to supply the needs of the body for 24 hours, while 1 pound of fat will support moderate activity for almost 2 days. When energy intake is reduced below energy expenditure, the first call is upon the stores of glycogen. But these are soon exhausted, and then the body begins to draw upon the energy which it has stored in the form of fat.

Moderate reduction of weight usually can be accomplished merely by eliminating from the diet foods of high caloric value, such as butter, cream, and other fats and carbohydrates. The quantity of food necessary to satisfy the appetite can be made up by fruits, vegetables, and lean meats.

A reduction of the daily energy (caloric) intake by 600 to 700 calories[2] should result in the loss of about a pound per week. For continued or more rapid loss further restriction of the diet is necessary.

A serious deficiency of many reducing diets is that they do not supply the minimum requirements of the body for protein, minerals, and vitamins. Without these, fatigue, nervousness, digestive disturbances, and an irresistible craving for food develop. On the other hand, patients report that they are not uncomfortable on very restricted diets, if these needs are supplied. Every reducing diet should contain liberal quantities of the vitamins and sufficient minerals and protein to supply requirements.

In the more difficult cases and in cases of extreme obesity, weight reduction should be preceded by a thorough physical examination. If dietary measures are indicated, the caloric intake necessary to maintain normal weight should be computed and

[2] The following food portions represent 600 to 700 calories: four slices of bread and four squares of butter; a pork chop and a piece of pie; two pieces of bread with butter and one serving of mashed potatoes with butter or gravy, etc.

the diet planned so that this amount will not be exceeded. Gradual weight loss is usually preferable to rapid reduction because the subject becomes adjusted to smaller quantities of food and so is more likely to maintain a desirable weight after it has been attained.

If more rapid reduction in weight is desired, there must be a greater limitation of energy foods in the diet. For this purpose diets which supply from 1,000 to 1,500 calories per day have been recommended. Still more limited diets have been shown to be perfectly safe, provided they are adequate in protein, minerals, and vitamins. One diet advocated by Strang, McClugage, and Evans supplied approximately 360 calories a day and resulted in weight loss of as much as 4 to 5 pounds a week. Wilder's modification of this diet suggests 500 to 600 calories per day in order that more foods containing vitamin C may be obtained. Vitamins A and D are supplied in a cod-liver oil concentrate, vitamin B in yeast. Calcium and phosphorus are supplied by giving 2 level teaspoonfuls of dibasic calcium phosphate. Fluids are not restricted.

By selecting a dietary program with the advice of a physician and following it intelligently and conscientiously, every normal person can reduce weight. Those who fail to do so usually are unwilling to forego the transitory pleasure of indulging the appetite for the greater joy of health, vigor, and longer life in the future. Others are successful in reducing weight but gradually slip back into their old dietary habits.

To be of real benefit, weight reduction must be followed by the maintenance of normal weight.

If certain diseases exist, such as actual or suspected tuberculosis, anemia, and certain nervous conditions, dieting should not be undertaken. But for every case in which dieting is undesirable there are scores whose health and efficiency will be benefited by a reduction of weight.

The usual experience of those who get rid of excess weight is that they feel better and have more physical and mental energy than when they were overweight. Persons with high blood pressure, diabetes, and heart disease frequently experience relief of

symptoms and improvement of their physical condition when weight is reduced.

Such results are adequate compensation for the inconvenience and effort required to maintain a desirable weight. Better, however, than to reduce weight is to learn in early adult life the importance of preventing obesity. It is easy to lose 2 pounds but difficult to lose 20. Habitual moderation in eating and a reduction of energy foods whenever there is a tendency to exceed "normal weight" are the best ways to solve the problem of obesity.

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## Chapter VI

# DIGESTIVE DISTURBANCES

THE types of digestive disturbances causing abdominal discomfort are numerous. Sometimes the basis is true organic disease, but much more frequently the disturbances are functional rather than organic in nature. In any case, abdominal disturbances merit careful investigation and intelligent treatment.

## Dyspepsia

Dyspepsia or indigestion is a vague, unscientific term used to designate various types of discomfort in the region of the stomach. Dyspepsia may be due to unimportant functional causes, or it may be an early symptom of serious disease.

The late Dr. A. B. Rivers of the Division of Medicine of the Mayo Clinic summarized the results of a survey relative to the occurrence of dyspepsia among a large number of patients who came to the clinic for examination. This analysis shows that about half of the men forty years of age and older who complained of dyspepsia were found to have ulcer of the stomach, gall-bladder disease, or cancer of the gastrointestinal tract or accessory organs. Every sixth man of the group was found to have cancer of the stomach, pancreas, or intestine. Of women of the same age group, two out of five were found to be suffering from gall-bladder disease, ulcer or cancer of the stomach, or cancer of the pancreas or intestine.

*Cancer of the stomach* is responsible for approximately one-third of all cancer deaths and for about one in every 20 deaths among persons over forty-five years of age. Unfortunately, cancer of the stomach rarely produces definite symptoms early in the disease, at the time that the possibilities of cure would be the greatest. In fact, the early symptoms are usually nothing more than mild "indigestion." Eventually a physician is consulted and a diagnosis made, but all too frequently and tragically precious time is wasted trying suggestions of friends or preparations advertised for the cure of indigestion.

*Ulcers of the stomach or duodenum* are a common cause of so-called "chronic dyspepsia." About one person out of ten at some time will have an ulcer. Ulcers usually result from an excessive flow of the stomach's acid-containing digestive juices. It is now recognized that nervous tension, worry, and emotional strain, even more than food and drink, stimulate the flow of these juices. The successful treatment of ulcer, therefore, depends upon the elimination of mental tension and turmoil as well as upon medical or surgical measures.

Duodenal ulcers (Fig. 3) rarely, if ever, are cancerous. On the other hand, 20 to 30 per cent of gastric ulcers (ulcers of the stomach) are cancerous. It is imperative therefore that the exact nature of an ulcer be diagnosed as early as possible to determine what type of treatment is necessary.

Since most ulcers are accompanied by excessive secretion of acids, smooth nonirritating diets and mild alkalies, such as soda, help to relieve symptoms and facilitate healing. This common knowledge forms the basis for practically all the indigestion cures offered to a credulous public. The undirected use of such preparations in many cases is perfectly harmless and may give relief, but occasionally an ulcer may be malignant (cancerous) or the symptoms supposedly due to an ulcer may be the first warning of a beginning cancer. In order to "play safe" the possibility of cancer should be considered in every person over forty years of age who suffers from chronic dyspepsia or indigestion. To seek relief of symptoms by self-medication is unintelligent and hazardous.

*Appendicitis* is one of the important causes of death in every age group, yet most of the 16,000 annual deaths from appendicitis can be explained by a single word—neglect. The risk increases with each day and hour that a "stomach-ache" of unknown cause persists. Proper attention to abdominal pain, early medical care, and immediate operation, when indicated,

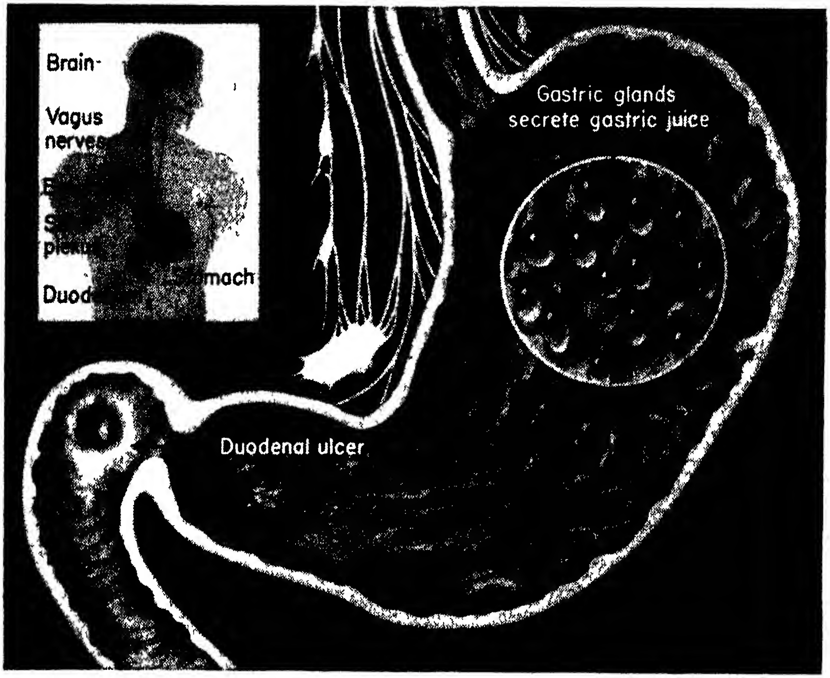


FIG. 3. THE HUMAN STOMACH. (*Courtesy Northwestern National Life Insurance Company, Minneapolis, Minn.*)

are the secrets of preventing deaths from appendicitis. When an operation is performed within 24 hours of the beginning of the attack, less than 1 per cent of the patients die, but the risk is increased to approximately 12 per cent when operation is delayed until the fourth or fifth day. The use of cathartics during an attack of appendicitis greatly increases the risk. Dr. Bowers of Philadelphia reported that a study of several thousand cases of appendicitis showed that of those who had taken no laxatives, 1 in 62 died; of those who had taken one laxative, 1 in 19 died;

and of those who had taken two or more laxatives, 1 in 9 died. When the public can be trained to realize that abdominal pain, particularly if accompanied by nausea or vomiting and constipation, may indicate appendicitis, that cathartics may do irreparable harm, and that a physician should be consulted immediately, many thousands of lives will be saved each year.

### FUNCTIONAL DISORDERS

The most common cause of so-called "indigestion" is a functional disturbance of the digestive tract. That is, all the structures are normal; the trouble is that they do not function or act normally. However, the discomfort is very real and may be indistinguishable from that due to actual disease; hence, one should not assume that persistent abdominal symptoms are functional, even though vague and indefinite, until the possibility of a serious disease has been ruled out. Once the possibility of organic disease has been eliminated, the reason for the functional disturbance may be sought in the character of the food, the habits of eating, or the nervous or emotional state.

### ROUGHAGE IN THE DIET

The physical character of food is responsible for symptoms of dyspepsia in many people. Roughage, such as bran, fibrous fruits, and vegetables, is helpful in the correction of some cases of constipation, but the mechanical irritation which roughage produces leads to most distressing symptoms in others. The bowel fills with gas, discomfort increases, and the constipation may become more persistent. What such intestinal tracts need most is rest. This may be accomplished by starvation, but these people need nourishment; hence, a soft, nourishing diet is desirable. For the average person the use of bran in the diet cannot be recommended.

### NERVOUS INDIGESTION

It has long been known that food is most digestible and nutritious if it is appetizing, served under pleasant conditions, and eaten in a happy frame of mind; but only in recent years has

physiological research been able to explain the manner in which such factors influence digestion. We now know that the nervous system may affect the digestion in at least two ways: It may stimulate or retard the secretion of digestive juices; and it may increase or decrease the muscular contractions of the intestinal tract. Nervous stimuli are aroused largely by the emotions and reach the digestive tract through the autonomic (involuntary) nervous system.

The smell, taste, sight, and even the thought of appetizing food literally make the mouth of a hungry person "water." Coincident with this increase in the flow of saliva there is an increase in the secretion of the gastric juice and probably of other digestive juices. This is nature's preparation for the digestion of the anticipated food. The more attractive the food and the better its taste, the greater will be the amount of this secretion. Fear, pain, anger, and other strong emotions prevent this psychic secretion and so interfere with digestion if food is taken. Pavlov and others have shown, by placing food directly into the stomach, that some secretion of digestive juices occurs even in the absence of the stimuli of taste, smell, and sight, but for continuing health and normal digestion this psychic secretion is necessary.

## AUTOINTOXICATION

Patients in certain anxiety states may vomit food which is practically unchanged from its original condition, although it has been in the stomach for several hours. When such undigested food passes down the intestinal tract, it is acted upon by putrefactive bacteria with the production of toxic substances. These in turn may give rise to symptoms of lassitude, headache, fatigue, and abdominal discomfort. Such a condition is commonly called "autointoxication." Its prevention or correction must be accomplished through the control of nervous and emotional factors and not by the use of cathartics or "intestinal antiseptics."

## EMOTIONS AFFECT DIGESTION

The effect of emotions upon the movement of the stomach and intestines has been observed in both man and animals. An

ancient Hindu custom required persons suspected of a crime to chew a mouthful of rice and after a time to spit it out upon a fig leaf. Dry rice was taken as proof that the fear of being discovered had prevented the secretion of saliva, and the suspect was adjudged guilty. Fear and apprehension also may produce diarrhea or constipation. Milder degrees of concern or worry over the affairs of everyday life frequently result in spasticity of the musculature of the intestinal tract. This is usually accompanied by gaseous distention and discomfort, frequently described as a sensation of the intestines being "tied up in knots."

## COLITIS

Axel Munthe, in his "Story of San Michele,"[1] suggests that colitis was invented to serve as a respectable diagnosis when appendicitis began to wane in popularity because surgeons insisted upon operating. People wanted a diagnosis safe from the surgeon's knife and they were given colitis. Whether or not this was its origin, functional colitis today is a very real and distressing condition. In many cases it is the end result of attempts to correct by physical means a spastic, irritable bowel, tied up with a sensitive, overwrought nervous system. Bulky diets, cathartics, and enemas are the measures usually employed. What such persons need is a bland, nourishing diet and relaxation. To accomplish this, either a solution of, or an adjustment to, one's emotional problems is necessary.

## EATING AS AN ART

The health of many people would be improved if they would make an art of eating. This art should include coming to meals with an even temperament and without undue fatigue; if one is tired a rest before dinner should be arranged. The meal should be appetizing, the surroundings attractive, and the dining room quiet. Eating should be slow; the best flavors of foods are lost unless they are thoroughly masticated, and thorough mastication improves digestion and reduces the quantity of foods desired.

[1] Munthe, Axel, "The Story of San Michele," E. P. Dutton & Co., Inc., New York, 1930.

Liquids should not be used to carry foods from the mouth to the stomach; the taking of water during meals when there is no food in the mouth is, however, not harmful, although ice water, particularly on an empty stomach, diminishes the secretion of the digestive juices. Overeating should be avoided; it is a wise habit for adults to discontinue eating before the appetite is completely satisfied. Pleasant conversation, a leisurely attitude, a bowl of soup at the beginning of the meal, would prevent many cases of indigestion. Actually the eating habits of most of us are abominable. We rush through our breakfasts and lunches without taking time to relax or to masticate our food. By dinnertime we are fatigued so we stimulate ourselves by turning on the radio or going out to eat in some place so noisy that conversation is impossible. Here most of us overeat and make no effort to select food suited to the type of life which we lead.

## Constipation

It is reported that the American people spend 50 million dollars a year for cathartics. Actually very few people need cathartics, and many more are harmed than are benefited by them.

Constipation is not a specific disease which can be prevented or cured by any single form of treatment. In fact, an exact definition of constipation is difficult; for a condition of the bowels which one person considers normal, another may interpret as evidence of constipation. There is not even agreement as to the optimum frequency of bowel movements. Some persons in good health regularly have two or three bowel movements per day, while others equally well have only one bowel movement in two or three days. The desire for defecation occurs when a sufficient volume of material from the intestinal tract has reached the rectum. The periodicity with which this occurs depends upon the activity of the musculature of the intestinal tract and upon the quantity of indigestible material in the diet. Most persons in good health have one bowel movement a day, but there is no inexorable rule of nature which makes this necessary. The attempt to regulate the bowels in accordance with one's ideas

concerning the frequency with which they should act is the cause of much ill-health and invalidism.

### CAUSES OF CONSTIPATION

The most frequent causes of constipation are overactivity of the musculature of the intestinal tract, underactivity of this musculature, and disease, usually of an inflammatory nature, with the abdomen. Intelligent treatment of constipation must be based upon the relief of the conditions which produce it; and with such a variety of causes it is obvious that no one method of treatment can be satisfactory. In some conditions a laxative is beneficial; but if the bowel is already overactive, the use of cathartics or irritant diets, although giving temporary relief, will eventually aggravate the condition. If constipation is due to appendicitis, cathartics are certain to increase the seriousness of the condition and may lead to rupture of the appendix.

So, with constipation possibly an illusion or, if it actually exists, only a symptom, the wisdom of obtaining a thorough examination to determine its cause before attempting treatment becomes apparent.

### PREVENTING CONSTIPATION

The prevention of constipation should be based upon normal, wholesome management and not upon dietary fads. The following are some simple general rules to accomplish this:

1. Eat a normal, balanced diet. The bulk of roughage is provided by fruits and vegetables. Stewed fruits, particularly prunes, may well be used occasionally to obtain regularity of movement.
2. Make a regular habit of going to the toilet each morning, preferably just after breakfast. This is the time that regularity can be most easily established.
3. Develop the habit of nervous relaxation. Nervous tension, especially at mealtime, is likely to lead to an overactive, spastic intestine.
4. Drink reasonable but not excessive quantities of water. A glass of water after rising in the morning frequently aids in the establishment of regularity of defecation.

5. Take some regular exercise. Walking is frequently adequate, although if there is a tendency to constipation, bending and leg-raising exercises which strengthen the abdominal muscles are helpful. Strenuous exercise is undesirable.

### SPASTIC CONSTIPATION

In the type of constipation due to an overactive, irritable, spastic bowel, the actual cause may be a rough, irritating diet, the habitual use of cathartics, or actual disease of the intestines, or it may be secondary to emotional or nervous tension or to disease in other parts of the body or abdomen. The usual symptoms which accompany this type of constipation are abdominal pain or tension, gaseous distention of the bowel with belching, tenderness over the colon, and small, mushy, or ball-like stools. In the more advanced and severe cases headaches, fatigue, nervousness, nausea, and vomiting may be present. Effective treatment of this condition requires careful medical supervision and wholehearted cooperation on the part of the patient, and such treatment should be begun before the disease has become too chronic. Experimentation with self-medication will only make matters worse and the condition more difficult to correct.

### SIMPLE CONSTIPATION

When constipation is due to a sluggishness of the musculature of the intestinal tract, stimulation of the colon is necessary. Cathartics accomplish this by increasing the fluid content of the intestines. A better way is to increase the bulk of indigestible material in the diet. This means more leafy and fibrous vegetables, fruits raw and cooked, and whole-grain cereals. Bran, in the form of cereal, bread, biscuits, or crackers, is useful in some cases but highly irritating in others. In obstinate cases of this type of constipation the diet may be supplemented with agar-agar or psyllium seed.

Agar-agar (Japanese seaweed) when moist provides a non-irritating indigestible material which gives bulk to the diet. A dessertspoonful with each meal is usually adequate. The granu-

lated form of agar is just as satisfactory as the various commercial preparations and less expensive.

Psyllium seeds, when moist, provide both bulk and lubrication. Two teaspoonfuls at each meal, mixed with any convenient food, are recommended in mild cases.

In the past, mineral oil was widely used to soften the intestinal contents. Recent studies, however, have shown that mineral oil prevents the absorption of vitamin A and may have other deleterious effects. Its use, therefore, is no longer advised.

## Dietary Fads and Fallacies

The food faddist, with his missionary spirit and his pet prescription for health, is always with us. Each one has a different prescription from that of his predecessors but is just as zealous in his efforts to convert mankind to it. Some of these fads are dispensed in a spirit of charity. Others are well paid for by those seekers after health who have more money than good sense. Of the many types of dietary fads the following are most common:

*Vegetarianism.* The disciples of this fad usually follow it either because they consider animal foods deleterious to health or because they object to the destruction of animals to supply food for man. This latter reason is purely sentimental; but the former merits consideration.

Professor E. V. McCollum, a leading authority on nutrition, has written that "a vegetarian diet, supplemented by fairly liberal amounts of milk is the most satisfactory type of diet that man can take." But this is not true vegetarianism. In fact, milk, butter, eggs, cheese, and other dairy and animal products are rarely left out of the diets of vegetarians. Hence, most "vegetarians" are not really vegetarians but only abstainers from meat.

Most health fads are based upon a certain amount of truth and in this regard vegetarianism is above the average. We have pointed out that fruits and vegetables are the best source of most of the vitamins and minerals, and that the legumes and the cereal grains are the cheapest energy foods. On the other

hand, the body must have a certain amount of protein. This probably could be obtained, as is done by herbivorous animals, from the plant kingdom, but large quantities of food would have to be consumed and even then there would be danger of deficiency. Furthermore, the human digestive tract is not intended for an exclusively herbivorous diet. For man, animal foods, such as meat, eggs, milk, and dairy products, improve the palatability of the diet and provide the proteins which are most completely and easily utilized by the body.

*The Water Fad.* This is usually followed on the theory that one should practice "internal bathing" just as one bathes one's hands and face. For this there is no scientific basis whatever. A glass or two of water the first thing in the morning may aid in the maintenance of regular bowel movements. Hot or cool water before breakfast seems to be beneficial to some persons but produces distress in others.

*Raw Foods Fad.* The advocates of eating food raw almost exclusively can find some justification in the fact that cooking reduce the vitamin and mineral content of certain foods. On the other hand, cooking not only improves the flavors of many foods but also makes them more easily digested. Thorough cooking is also an important factor of protection against diseases which are transmitted by foods. Raw foods are exposed to many possibilities of infection and may carry the causative organisms of such diseases as typhoid fever, amebic dysentery, and hookwork. Meat should always be cooked and fruits and vegetables thoroughly washed before use.

*Alkaline Foods.* Advertisers of foods and drugs have acquainted the American public with the term "acidosis." They are not specific as to what they mean by it but they assure us that it is a menace to health and that we should guard against it by eating foods or taking drugs which will alkalize the body. Citrous fruits—oranges, lemons, grapefruit—are particularly recommended for the prevention of colds and influenza. Actually there is no evidence that acidosis is related to these conditions, nor that acidosis ever occurs except in certain definite disease conditions.

*The Mixing of Foods.* It is asserted, too, that the mixing of certain types of foods is deleterious; that acid and alkaline foods, or that proteins and carbohydrates, should not be eaten at the same meal. The alkaline-acid bugaboo should disappear with an understanding that upon oxidation most fruits and vegetables yield both acid and alkaline residue. Nature has combined these foods, so it seems unreasonable for us to attempt to separate them artificially in the diet. In an average, balanced diet the acid- and alkali-producing foods are so well balanced that no thought needs to be given to them.

*Mixtures of Carbohydrates and Proteins.* The alleged incompatibility of carbohydrates and proteins is the basis of one of the current dietary fads. It is explained by those who advocate this theory that, though many normal people can digest mixtures of these foods, the person with a sensitive, delicate digestion is unable to do so. In so doing they seem to have overlooked the fact that mothers' milk, which is the perfect food for the delicate digestive tract of the newborn infant, contains both carbohydrates and proteins. Furthermore, studies of normal individuals have revealed no differences in the digestion of these foods whether they are taken separately or together.

*Dieting.* For the obese individual, dieting is a valuable health measure, but dieting by young women of normal weight is neither healthful nor beautiful. Extreme underweight in young persons apparently predisposes to tuberculosis, and the ill-balanced diets frequently adopted are likely to be lacking in essential foods. In their efforts to remain thin many persons form the habit of going without breakfast. This is undesirable; for the body needs food to support the day's activity and it is better to supply this in moderate quantities than it is to overload the stomach once or twice a day and starve it the rest of the time. In many countries it is the custom to eat even more than three meals a day.

## Ptomaine Poisoning

Severe disturbances of the digestive tract accompanied by nausea, vomiting, and diarrhea are usually labeled "ptomaine

poisoning." The word "ptomaine" implies that there has been decay of protein foods with the formation of poisonous substances. Theoretically this could occur but actually it rarely if ever does. Hence, the term "ptomaine poisoning" is really a misnomer.

The disturbances which go by this name belong to one of several groups: First, they may be due to poisonous substances in the food; second, they may be caused by disease-producing germs consumed with the food; and, third, they may be due to an individual peculiarity or sensitivity which causes an abnormal reaction to foods which in themselves are perfectly wholesome.

## True Food Poisoning

In the class of true food poisoning belong mushroom poisoning, shellfish poisoning, botulism, and the occasional poisoning caused by decomposed food.

*Mushroom Poisoning.* Although few varieties of mushrooms contain deadly poison, these are responsible for a considerable number of deaths in the United States each year. Unfortunately for the amateur, there is no rule-of-thumb test by which the deadly ones can be identified. The "silver spoon test," the belief that poisonous mushrooms do not grow on wood, and various generalizations concerning appearance are all unreliable. In fact, one of the most deadly mushrooms, the *Amanita phalloides*, is pure white in color and unusually innocent and delectable looking. The way to be safe in the eating of mushrooms is to use only those which have been raised commercially or which can be positively identified. The collection of mushrooms is an interesting study but the tasting of them a hazardous avocation.

*Shellfish Poisoning.* Within recent years on the west coast a considerable number of persons have been made ill and some deaths have occurred from eating shellfish, particularly mussels and clams. The poisoning seems to be due to certain forms of microscopic aquatic life which these shellfish at times take as food. In the shellfish the poison is most concentrated in the liver. Even the broth made from such shellfish may be poisonous. To

avoid this hazard one should forego the use of shellfish gathered from certain areas during the summer months.

*Botulism* is caused by deadly poison (toxin) which is secreted by the botulinus germ as it grows in certain foods. The name "botulus" means sausage, to which the first recognized cases of this disease were traced. Since that time botulism has been caused by various animal and vegetable foods. In chickens, turkeys, and ducks it produces a disease known as "limberneck."

The botulinus germ multiplies only in the absence of air, but as it grows it liberates a powerful poison. This is taken into the body with the food, absorbed from the intestinal tract, and carried by the blood to the central nervous system, where it produces paralysis. Nausea and vomiting, the usual symptoms of food poisoning, do not occur because the botulinus toxin causes little or no disturbance of the intestinal tract. Upon the central nervous system, however, it is one of the most potent toxins known, 1/25,000,000 ounce being enough to kill a guinea pig of average size. Dickson reports that a patient died after "nibbling" a portion of a pod of spoiled string bean; that another died after tasting a small spoonful of spoiled corn; and that a third was ill after tasting a pod of a bean which she did not swallow. The botulinus spores resist boiling, but the toxin is destroyed by heating to 175 degrees Fahrenheit for a few minutes. Consequently, botulinus poisoning usually follows the eating of canned foods which are not cooked before serving.

Outbreaks of botulism have been traced to fish, ham, sausage, beef, turkey, chicken, cottage cheese, mushroom sauce, string beans, corn, berries, peas, spinach, and ripe olives. In Soviet Russia botulism has been caused chiefly by smoked, dried, or salt fish which is used as a food without cooking. A vegetable salad served as a midnight lunch on a farm in North Dakota in 1931 was responsible for thirteen fatal cases of botulism. A total of sixteen persons partook of a salad consisting of carrots, peas, and cut string beans. Three of the group had been drinking "moonshine" and vomited during or just after the lunch. All of the others became ill and died. In this instance, as in numerous others, home-canned string beans were the food responsible.

Commercially canned foods, because of the greater heat used in the canning process, are much less likely to be a menace than home-canned foods. In fact, for more than ten years no reported outbreaks of botulism have been traced to commercially preserved foods.

The botulinus bacillus is widespread in the soil, particularly of the West and Middle West. It is destroyed or its growth prevented by sufficient heat, acid mediums, and 10 per cent salt brine. In order to guard against the hazard of this poisoning all canned vegetables should be thoroughly heated before use and all jars or other containers of canned foods should be discarded when there is any bulging, leaking, abnormal odors, or other sign of spoilage. The spoilage may be so slight as to be undetectable. Hence, continued outbreaks of botulism may be anticipated until there is an end to the serving of home-canned vegetables as salads. Thorough heating is the greatest safeguard against botulism.

*Insecticide Hazard.* The widespread spraying of fruit trees and vegetables with insecticides containing arsenic and lead has introduced a new hazard in connection with certain foods. An outbreak of "food poisoning" in California a few years ago was traced to the eating of broccoli which had been sprayed with arsenic.

Just how extensive or serious this danger is there is no way of knowing. Some manufacturers of infant foods are refusing to accept fruits and vegetables which contain DDT or other insecticides that cannot be removed in processing. Certainly, it is reasonable to take the precaution of thoroughly washing vegetables and of discarding the skins and cores of fruits which have been sprayed. Some states require that all such fruits be washed in an acid solution before being marketed.

*Decomposed Foods.* Poisoning from foods in which partial decomposition or decay has occurred is rare in adults but more frequent in infants. Many foods such as buttermilk, cheese, sauerkraut, and vinegar are products of partial decompositions by bacteria, molds, or yeast. When this decomposition affects carbohydrates we call it "fermentation," when it affects pro-

teins, "putrefaction." It is particularly in the bacterial decomposition of proteins that substances which are toxic or irritant to the intestinal tract may be formed. Such changes are most likely to occur in foods not adequately refrigerated[2] during the summer months. These products are of low toxicity and in adults rarely cause symptoms. In infants, however, they may produce severe and serious nausea, vomiting, and diarrhea.

Practically all protein foods are susceptible to such decomposition, but milk and milk products are particularly likely to be involved. The reasons for this are that milk is an ideal medium for the growth of bacteria, that it contains proteins which easily decompose, and that it is used in relatively large quantities in the diets of infants. Pasteurization will destroy disease-producing bacteria that may be in the milk, but it does not kill all the putrefactive bacteria, nor does it have any effect upon the products of their growth which are already in the milk. The receipt of a bottle of ice-cold pasteurized milk gives one a great sense of security, and justifiably so; but if it were possible to see beyond the pasteurization plant to the sanitary conditions on the farms where some milk is produced, to the manner in which it is handled and transported to market, one might hesitate before using it, particularly for infants. In its raw state such milk is a danger to anyone. Pasteurized, it is safe for adults and relatively safe for children. Infants, however, should have milk which first is just as clean and sanitary as it is humanly possible to make it, then properly pasteurized, refrigerated at all times, and finally boiled before use.

## Food Infections

Most of the cases of so-called "ptomaine" poisoning or food poisoning are really food infections; that is, the symptoms are due not to poisoning but to actual infections of the intestinal tract by germs which enter the body with food or drink. Most of these infections are accompanied by nausea, vomiting, diarrhea, and a little fever. In adults they may cause more or less

[2] Adequate refrigeration means a temperature of 45 degrees or less at all times. A thermometer should be used to determine icebox temperatures.

incapacity for several days but are rarely serious. In children, particularly very young children, these infections are of major importance.

The germs which cause them get into the food in various ways. Meat may come from infected animals or become contaminated in the slaughterhouse. Flies, cats, dogs, mice, rats, and human carriers may contaminate food. As a rule these food infections occur only when enormous quantities of the germs are consumed. Thorough cooking and boiling destroys them. Consequently, the foods most likely to cause trouble are those in which the germs have had a chance to multiply and which have not been thoroughly cooked just before serving. Hashes, meat salads, custards, and dairy products which have been handled or prepared some hours before use are the types of foods most frequently involved. Hence, it is wise to avoid such foods unless one knows under what conditions of sanitation and refrigeration they have been kept. Foods which have been thoroughly cooked just before serving are the wisest choice in restaurants and hotels. In the home careful selection and handling of foods, adequate refrigeration, and thorough cooking are the best safeguard against food infections.

The *more serious infections* contracted through food and drink include typhoid fever, dysentery, and various parasitic diseases, such as trichina and tapeworm infestations. Typhoid and paratyphoid fever in the United States today are disseminated largely by carriers of these germs engaged in the preparation of food; and milk and milk products are most frequently involved in their spread, because if the germs of typhoid or paratyphoid fever get into milk, they multiply rapidly whenever the milk gets warm. Pasteurization destroys these germs, so there is no danger of infection from milk that has been properly pasteurized and safeguarded from contamination after pasteurization. Only bottled milk should be used for purposes other than cooking. Other foods which may disseminate these diseases are the same as those responsible for the less severe food infections; that is, foods which favor bacterial growth, tend to be exposed to infection through handling, and are served cold or without thorough

cooking. Avoidance of such foods at public eating places will reduce the danger of contracting these diseases.

Amebic dysentery is usually contracted from water, and the hookworm commonly enters the body through the skin of the feet of persons who walk barefoot upon infected soil; but either of these diseases may be contracted from food. Fresh, uncooked vegetables, such as lettuce, radishes, and celery, which have been grown in contaminated soil are particularly dangerous.

Animal foods are the source of several parasitic infestations of man. Beef may transmit the beef tapeworm; pork, the pork tapeworm and trichina; and fish, the fish tapeworm. Meat inspection gives some protection against the beef and pork tapeworm. But fish and most of the meat which is slaughtered and used locally are not inspected. Furthermore, the inspection of meat does not include an examination for trichina.

A study of 300 diaphragms of cadavers, coming from ten hospitals in Washington, D.C., and one hospital in Baltimore, Maryland, showed encysted trichina in 13.67 per cent. The author of this study emphatically states "that the United States apparently has the greatest problem of trichinosis of any country in the world, a problem involving in one way or another and in some degree several million persons." More recently 64 cases were reported in one CCC camp from the eating of roast pork which was not thoroughly cooked in the center.

The cysts of the tapeworm which occur in beef, fish, and pork are likewise readily destroyed by heat. Smoking and drying will not destroy these parasites. In certain sections of Europe where raw fish is considered a delicacy, fish tapeworm infestation is prevalent. In this country cases have developed as a result of eating or tasting uncooked or partially cooked fish. Beef or pork is rarely eaten raw, but "rare" beef may contain living parasites. The avoidance of uncooked or inadequately cooked fish and meat is the only safe insurance against these infections.

## Milk—A Potentially Dangerous Food

Of all foods in the dietary of man milk is the most nearly perfect. Unfortunately, however, it is an ideal food not only for

man but for many of his microscopic enemies as well. Milk is difficult to obtain, transport, and deliver in a sanitary condition and is the only animal food extensively used by man in a raw state. Disease-producing germs may get into milk either from a diseased animal or from human beings who have contact with the milk.

The diseases of animal origin which one may get through milk are tuberculosis, undulant (Malta) fever (also called brucellosis), foot and mouth disease, and intestinal ailments resulting in diarrheal conditions, especially in children. In addition milk may be contaminated with disease-producing germs by persons who handle milk or milk products. A few germs accidentally introduced into the milk at the time of milking may develop into many millions by the time the milk is consumed. The diseases of human origin most commonly spread by milk are typhoid fever, septic sore throat, scarlet fever, and diphtheria. In the twenty years from 1908 to 1927, 429 milk-borne outbreaks of typhoid fever with a total of approximately 15,000 cases were reported in the United States.

Epidemics of scarlet fever traceable to raw milk are reported every year. One of these occurred in Oswego, New York, in December, 1936. This outbreak involved 300 cases of scarlet fever and was traced to raw milk from a single cow.

Fortunately the disease-producing germs found in milk are easily killed by heating the milk to a temperature which does not change its value as a food. This process of heating,[3] called "pasteurization," is the health measure which makes it possible to produce and distribute milk on a large scale and still have it a safe food. However, pasteurization is not all that is desirable in a milk supply. In addition milk should come from healthy cows, be collected in a clean, sanitary manner, kept in sterile containers at low temperatures, and transported as rapidly as possible to the pasteurization plant. Clean, high-grade, pasteurized milk from healthy cows is an objective toward which every community should work. Of all these safeguards, however, pasteur-

[3] Holding the milk at a temperature of 145 degrees Fahrenheit for 30 minutes is the practice recommended for pasteurization by the U.S. Public Health Service.

ization is much the most important. At the present time approximately 90 per cent of the milk used in American cities of 10,000 population and over is pasteurized, but all too many smaller communities are still exposed to the hazard of raw milk. Milk products, such as butter, cream, and cheese, also should be pasteurized because they, too, may transmit disease.

## Raw Milk

Raw milk is claimed by some of its advocates to have greater nutritional value than pasteurized milk. There is, however, no real evidence that pasteurized milk is inferior to raw milk as a food, even for infants. A study by the U.S. Public Health Service compares the rates of growth and the illnesses of 1,875 children who received heated milk with the growth and illnesses of 1,762 children who were fed predominantly on raw milk. Both groups received in addition to the milk the average American child's diet. The conclusions of this study are that children who are fed pasteurized milk or other heated milk thrive as well as children who are fed raw milk and contract certain communicable diseases less frequently.

Pasteurization decreases somewhat the vitamin C content of milk, but since milk is not a dependable source of vitamin C this is of no consequence. A milk diet should always be supplemented with orange juice or some other good source of vitamin C.

The individual's part in safeguarding himself and his family against the hazards connected with nature's best food is to use only milk products which are properly pasteurized and to demand milk which is clean and wholesome even before pasteurization. For infants the very best quality of milk, preferably certified, should be obtained and then boiled.

## Sanitary Food Handling

Health departments the country over are making rapid strides in safeguarding the basic sources of food and drink from contamination with the germs of communicable diseases. But several important questions can still be asked concerning the delivery

of these to the ultimate consumer: Are the food handlers themselves free of communicable diseases, are they cleanly in their personal habits, and are the methods which they employ in the serving of foods sanitary?

A few cities require that all food handlers who are working in public eating places be given physical examinations before employment. Theoretically, this would seem to offer the public a considerable degree of protection, particularly since we know that some individuals are chronic carriers of the germs of such diseases as typhoid fever, dysentery, and diphtheria. Actually, however, the number of these carriers is so few and an adequate examination for the detection of carriers so expensive and so impractical to administer that food-handler examinations are rarely considered feasible as a general public health measure.

In spite of this, individual families employing domestic servants to handle foods, live in the home, and be closely associated with members of the family, would do well to insist upon physical examinations before employment to insure freedom from active tuberculosis if for no other reason. A few years ago a Vienna physician wrote feelingly on this subject because three of his four children became ill with tuberculosis and one died as the result of infection from a nursemaid who had been with the family for many years and had had a mild cough which she and the family had considered as coming merely from "chronic bronchitis."

More important and more practical as a general health measure than the physical examination of food handlers is the insistence on personal cleanliness, which means, primarily, frequent and thorough washings of the hands, and adequate medical supervision of acute illnesses among employees. A cook could well be a typhoid carrier all of her life without ever infecting anyone if she always washed her hands thoroughly after use of the toilet and before handling foods. On the other hand, a person who had had a physical examination last week might develop a mild diphtheritic sore throat next week and if she continued on the job spread the infection to others. The employees of food-handling establishments should not continue on the job when

they are ill and should be certified as noninfected by a physician before returning to work.

Eating utensils which are inadequately sterilized before use also may serve as the means of transmission of infection. Many public eating establishments neither thoroughly clean nor sterilize cups, glasses, and silverware after they have been used. Drinking glasses in saloons and roadhouses repeatedly have been found to contain tens of thousands or even hundreds of thousands of germs per glass, many of them capable of producing disease. The soda clerk in the drugstore rarely washes glasses and frequently dips them in filthy water which is veritably alive with bacteria. One investigator reported that the rinse water used for glasses had a bacterial count slightly in excess of that usually found in sewage. The common drinking cup has long since been outlawed but in many establishments which serve food and drink it is still with us in actuality. Public health ordinances which require reasonable sanitary precautions in the handling of food and drink should be insisted upon—and then enforced. Adequate facilities for the employees to wash their hands and insistence that they be utilized are required by some health departments.

## Food Sensitivity

"One man's food is another man's poison" is one way of saying that some persons develop peculiar reactions to foods which for other persons are perfectly wholesome. Such reactions are called "food idiosyncrasies," "sensitivities," or "allergies." A variety of symptoms may result from these conditions. Most common among these are hives, certain eczemas, transient swellings of various parts of the body, "sick headaches" (migraine), dyspepsia, nausea, vomiting, diarrhea, bronchial asthma, and nasal congestion and discharge. These symptoms, of course, may be due to other causes as well as to allergy.

Allergic reactions are very selective, so much so that a person may react to one of the proteins of milk or eggs and not to others. Still, symptoms of hypersensitiveness frequently are precipitated or aggravated by nonspecific physical, chemical, or mechanical

irritants or physiological disturbances. For example, persons with indigestion as a result of food sensitivity usually are worse after cathartics, roughage, or other irritating substances in the diet, and a nose which is stuffy because of spinach, eggs, or chocolate in the diet or feathers in the pillow or a dog or cat about the house may be kept in a condition of chronic irritation by smoke, dust, sprays, or "nose drops."

The foods to which one may become sensitive include practically the entire diet, although spinach, lettuce, strawberries, sea foods, chocolate, and eggs are the most common offenders.

The cause and the exact mechanism of the development of these sensitivities are still largely a mystery. Heredity is an important factor but not the only one involved.

Some physicians believe that these sensitivities are purely of nervous origin. This is an extreme point of view, although there is a nervous element in many of these cases. There are even persons who make semi-invalids of themselves by imagining that they are sensitive to one food after another.

The diagnosis of the allergic or sensitive state and the determination of the foods or other substances involved are pieces of medical detective work sometimes very difficult to solve. Skin tests with extracts of the suspected foods, and the adoption of diets from which certain foods are eliminated are some of the special procedures which supplement a careful history of the conditions under which the attacks occur.

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# Chapter VII

# STIMULANTS AND NARCOTICS

THE good fellowship, sociability, and pleasant stimulation associated with the use of tea, coffee, tobacco, and alcohol make difficult an unprejudiced consideration of their influence upon health. The fanatic, on the one hand, depicts them as insidious poisons which undermine character as well as health. Commercial interests, on the other, portray their use by superb physical specimens of young manhood and womanhood, implying in some instances and actually stating in others that their use is beneficial to health and essential to the full enjoyment of life. The truth lies somewhere between these extremes.

## Tea, Coffee, and Cocoa

For our purposes tea and coffee may be considered together because the important constituent of both is caffeine. Although tea leaves contain more than twice as much caffeine as coffee beans, an ordinary cup of either contains approximately a grain and one-half of caffeine, the dosage commonly used when caffeine is prescribed for medicinal purposes.

Cocoa contains a drug called "theobromine" which is similar to caffeine both in chemical structure and in the physiological effects except that it is less stimulating to the brain. Tea and coffee have no food value, and the food value of cocoa without milk or sugar is negligible.

The effects of various amounts of caffeine on the body have been extensively and carefully studied. Consequently, it is now well established that the amount of caffeine in two cups of coffee or tea ordinarily increases the volume and the rate of blood flow, the rate and depth of respiration, and the heat production of the body by 10 to 20 per cent.

The effects upon digestion are not so definite or so uniform. Some workers report a slowing of digestion, others an acceleration, and still others that it has no effect upon digestion at all. One of the most definite effects of caffeine is to increase the output of the urine. Whether the continued stimulation of the kidneys by caffeine causes any damage is debatable.

The most common reason for restricting the use of tea or coffee is the stimulating effect of caffeine on the nervous system. Ordinarily this effect is said to be a "heightening of the intellectual faculties and an increased capacity for physical and mental work"; but occasionally insomnia, nervousness, and headaches result from even the moderate use of tea or coffee.

Such disagreement concerning the immediate effects of caffeine makes it small wonder that there is considerable difference of opinion as to whether the habitual use of caffeine beverages is beneficial, harmful, or indifferent. Continuous use undoubtedly results in the development of some tolerance but this disappears rather promptly when caffeine is discontinued. Medical opinion, though by no means unanimous, is that the habitual use of caffeine beverages in moderate amounts, even if long continued, is not injurious to normal adults. On the other hand, excessive quantities probably are bad for anyone; and people who are particularly susceptible to caffeine or are afflicted with nervousness or certain other diseases undoubtedly do better to forego tea and coffee entirely.

## Tobacco

Tobacco seems to have been one of America's contributions to civilization. The mound builder smoked his pipe; and the cliff dwellers of Arizona and New Mexico smoked cigarettes rolled in the husks of corn. The early explorers learned its use

from the Indians and called it tobacco because of the Y-shaped pipe, *tobocos*, in which it was smoked. Later the Portuguese named it *nicotiana* because Johannes I. Nicotius, French ambassador to Portugal, introduced the plant into that country.

It is difficult for most smokers to explain just why they enjoy smoking. Sociability, custom, and nervous habit are undoubtedly factors. But the failure of efforts to promote denicotinized tobacco, even by government edict, indicates that the seductive qualities of tobacco are dependent upon the drug effect of its chief chemical constituent, nicotine.

### NICOTINE—A POWERFUL DRUG

Nicotine is a colorless, oily compound which in concentrated form is one of the most powerful poisons known. A drop applied to the tongue of the guinea pig or the shaven skin of a rabbit is sufficient to cause death. Less than one-fiftieth of a drop injected into the vein of a man causes a slowing of the heart rate, a rise in blood pressure, and a decrease in the temperature of the skin.

The amount of nicotine absorbed from tobacco varies with tobaccos and with the method of use. When tobacco is powdered and used as snuff, the proportion of nicotine absorbed is higher than with either chewing or smoking. Chewing, in turn, results in greater absorption than smoking. And there is more absorption from the smoking of tobacco in a pipe than in a cigar and more from a cigar than from a cigarette. There is evidence also that the smoke of damp tobacco contains more nicotine than that of the same tobacco thoroughly dried. For this reason it is claimed that smokers who chew the ends of their cigars absorb more nicotine than those who use a holder.

### THE EFFECTS OF TOBACCO

The effects of tobacco upon the body vary from those which are so slight that it is impossible to measure them, to acute poisoning. The latter is accompanied by symptoms of faintness, dizziness, cold clammy skin, rapid pulse, weakness, and sometimes nausea, vomiting, and diarrhea. These symptoms occur

most frequently in persons unaccustomed to the use of tobacco, but habitual smokers at times experience similar effects. These effects are of short duration and probably have little if any influence upon the general health.

Of greater interest and importance is the effect of tobacco in nontoxic quantities over long periods of time. On this question there is much positive opinion but relatively few scientific data. In some cases smoking seems to soothe the nerves and calm the spirits. In others it gives rise to headaches, giddiness, insomnia, and nervous irritability. Serious visual damage may result from the excessive use of tobacco. Vision may improve with the discontinuance of tobacco but occasionally the damage is permanent.

The advertising claims that certain cigarettes are less irritating than others is an admission that all are irritating to the membranes lining the nose, throat, and respiratory passages. Not infrequently, smoking is the cause of a persistent, irritating, and even debilitating cough.

Upon the heart and circulatory system the effects of tobacco occasionally are dramatic, producing pain in the region of the heart, irregularities of the heartbeat, and possibly even heart failure. Distinguished physicians even suggest that in certain individuals tobacco may be a factor in the development of angina pectoris and high blood pressure. Dr. White and associates of Boston reported that of 100 patients under forty years of age with disease of the coronary arteries, 93 per cent were smokers and only 7 per cent nonsmokers. This would seem to indicate an association between smoking and coronary disease in younger persons.

Drs. Wright and Moffat of New York have reported that the smoking of a single cigarette causes a marked drop in the temperature of the fingers and toes. In a hundred cases the average drop was 5.3 degrees Fahrenheit, and the greatest drop 15.5 degrees Fahrenheit. Coincident with the drop in temperature a slowing or stopping of the blood flow in the capillaries frequently occurred. Some of the most severe toxic symptoms and greatest temperature changes occurred in individuals who were

experienced and heavy smokers, a fact which leads the authors to conclude that

> . . . at least in many individuals, habitual smoking does not result in the development of an immunity from the toxins of cigarette smoke. It would seem, rather, that experience teaches one, often subconsciously, to control one's smoking so that the effects are kept at a submanifest point. This may involve what is termed desire. To be concrete, one does not take another puff from a cigarette if certain results of the one preceding are manifest. Similarly, a second cigarette is not smoked until the effects of the preceding one have worn off. Our experiments have shown that the length of time necessary for these effects to wear off varies greatly with different individuals and with the same individual at different times.[1]

They also found that practically identical effects are produced by various standard brands, by denicotinized, and by mentholated cigarettes.

This decrease in the temperature of the fingers and toes following smoking is probably due to the same physiological mechanism that is responsible for the relationship between smoking and Buerger's disease. In this disease gangrene of a limb occurs as a result of the blood supply being cut off, first by spasm of the arteries and then by the formation of a clot, or thrombus, within the vessels. In a large series of patients with this disease it was found that 80 per cent were sensitive to tobacco, as compared to 36 per cent of smokers without Buerger's disease and to 16 per cent of nonsmokers. Naturally, then, physicians advise against the use of tobacco by patients with this disease. In other types of diseases of the blood vessels experiments indicate that smoking may exaggerate symptoms rather than cause them.

From a study of the life histories of 6,813 men, of whom 2,094 were nonusers of tobacco, 2,814 moderate smokers, and 1,905 heavy smokers, Professor Raymond Pearl of Johns Hopkins University concludes that smoking is unquestionably associated with a definite impairment of longevity and that the degree of this impairment is proportional to the amount of tobacco

[1] Wright, I. F., and G. Moffat, "The Effects of Tobacco upon the Peripheral Vascular System," *Journal of the American Medical Association*, vol. 103, p. 318, August 4, 1934.

habitually used (Table 7). Heavy smokers experience the greatest average reduction in longevity, but even moderate smoking shows a measurable and significant impairment of longevity.

A cigar, cigarette, or a pipe after a meal may aid digestion or may give rise to indigestion, gaseous distention, spastic constipation, and occasionally even chronic colitis. Tuberculosis frequently has been attributed to smoking, but there is no evidence to justify this. Tobacco smoke, however, does contain

TABLE 7

TOBACCO SMOKING AND LENGTH OF LIFE*

The number of survivors at 5-year intervals starting at the age of thirty of (*a*) 100,000 white males who were nonusers of tobacco; (*b*) 100,000 who were moderate smokers but did not chew tobacco or take snuff; and (*c*) 100,000 who were heavy smokers but did not chew or take snuff.

| Age | Nonusers | Moderate | Heavy | Age | Nonusers | Moderate | Heavy |
|---|---|---|---|---|---|---|---|
| 30 | 100,000 | 100,000 | 100,000 | 65 | 57,018 | 52,082 | 38,328 |
| 35 | 95,883 | 95,804 | 90,943 | 70 | 45,919 | 41,431 | 30,393 |
| 40 | 91,546 | 90,883 | 81,191 | 75 | 33,767 | 30,455 | 22,338 |
| 45 | 86,730 | 85,129 | 71,665 | 80 | 21,737 | 19,945 | 14,498 |
| 50 | 81,160 | 78,436 | 62,699 | 85 | 11,597 | 10,987 | 7,865 |
| 55 | 74,538 | 70,712 | 54,277 | 90 | 4,573 | 4,686 | 3,392 |
| 60 | 66,564 | 61,911 | 46,226 | 95 | 1,320 | 1,366 | 938 |

* Pearl, Raymond, "The Search for Longevity," *Scientific Monthly*, vol. 46, pp 462–483, May, 1938.

substances which are irritant to the mucous membrane of the respiratory tract, and excessive smoking frequently results in a chronic cough and occasionally in a catarrhal condition of the nose and throat.

## PHYSICAL EFFICIENCY AND SMOKING

Smoking frequently results in some temporary stimulation and relief of fatigue, due, it seems, to a stimulation of the adrenal glands by nicotine. This effect, however, is of short duration and is usually followed by even greater fatigue than that which it relieved. Many persons report that they are more fatigued at the end of the day when they are smoking heavily than when they smoke occasionally or not at all.

Analyzing the evidence available on this subject, the editor

of the *Journal of the American Medical Association* concludes that the use of tobacco "even in moderate quantities seems to lower the efficiency of the heart under strain."

### SMOKING BY WOMEN

Since the emancipation of women has been extended to the use of tobacco, the question is frequently raised as to the probable effect of smoking upon women and through them upon their children and upon succeeding generations. As to its effect upon women themselves there is no reason to be more alarmed than there is concerning its effect upon men. As to its effect upon an unborn child there is more question.

Smoking by a pregnant woman produces an increase in pulse rate of the unborn child, and 4 ounces of breast milk from mothers who smoke six to eight cigarettes per day has been found to contain enough nicotine to kill a frog. A sufficient quantity of this certainly would affect the infant. As to the practical importance of this observation we have no information. It is perfectly conceivable that a package of cigarettes a day might be injurious to the unborn babe or the nursing infant, while three or four cigarettes might be no more injurious than a cup of coffee.

### SHOULD ONE SMOKE?

In spite of all the careful studies and observations of the effects of tobacco upon man and animals we are still unable to give a final answer as to the ultimate effects of moderate smoking upon health. There is abundant evidence that the excessive use of tobacco is deleterious and that individual susceptibility to tobacco varies enormously. Instances have been reported in which irregular heart action lasting for days or weeks followed moderate smoking. Furthermore, except for some possible nervous relaxation there is no known beneficial effect which tobacco exerts upon the body.

The decision to smoke or not to smoke should be made, but rarely will be, by weighing the pleasure which it gives, on the one hand, against the cost and possible risk involved, on the

other. If the decision is to smoke, smoking should be in moderation. Mark Twain, J. P. Morgan, and hosts of others smoked excessively to the end of long and useful lives, but the average man or woman is undoubtedly better off to smoke moderately or not at all.

What constitutes moderation is also an individual matter. Susceptibility to tobacco varies immensely and so does the susceptibility of the same individual under different conditions. The effect of a cigar leisurely smoked after dinner may be quite different from its effect if smoked when one is tired, hungry, and nervous. In general, if one has a chronic cough or is nervous and easily fatigued when smoking heavily, the only intelligent procedure is to reduce or, for a time at least, discontinue the use of tobacco. Some persons find it more difficult to smoke moderately than to discontinue smoking entirely, but others derive great satisfaction from the moderate and occasional use of tobacco.

To those who wish to smoke with the least danger of impairing health and vitality, Dr. James J. Waring gives the following suggestions: (1) Do not smoke until past the age of twenty-one years. (2) Use cigarettes, not more than five daily. (3) Do not inhale or blow smoke through the nose. (4) Smoke only immediately after meals. (5) At least once a year stop smoking for a month or more. (6) Have a health examination periodically.

## Alcohol

Alcohol is a seductive mistress whose virtues and vices it is difficult to weigh impartially. Scientists have shown conclusively that alcohol is a poison to living tissue. In reasonably concentrated solutions it will destroy plant, bacterial, and animal life. This is a serious indictment of something that we use as a beverage.

Even small amounts of alcohol produce definite and measurable effects upon the body. The chief of these is the depressant action upon the nervous system. Alcohol is generally thought to be a stimulant, but, except for the small amount of energy produced in its oxidation, this is entirely erroneous. The feeling

of exhilaration is the result of the depressant action on the higher brain centers, the ones which control restraint. With inhibition and restraint removed a feeling of exhilaration results if the effect of the alcohol is supplemented by the stimulation of companionship or activity. In the absence of such stimulation the narcotic effect of depression and sleepiness may be the only one observed. Larger quantities of alcohol paralyze one nerve center after another and eventually lead to unconsciousness. This last stage is identical with that obtained in ether anesthesia; in fact ether is a very volatile and active derivative of alcohol.

Nervous control and motor coordination are definitely reduced by alcohol. Grim evidence of this is the large number of automobile accidents which occur to drivers who have been drinking. Moderate amounts of alcohol interfere with attention, concentration, memory, judgment, and reason. The learning process in both men and animals is adversely affected. Speed of performance is slowed and errors increase.

Among the physiological effects of alcohol is a dilatation of the blood vessels resulting in a flushing of the skin and a sensation of warmth. This is usually accompanied by a slight fall of blood pressure and an increase in pulse rate. Larger doses depress the heart action and cause an increase in blood pressure. There is some evidence also that the continued use of alcohol may lead to a deposit of fat in the heart muscle with a consequent loss of its reserve power.

### ALCOHOL AND PHYSICAL EFFICIENCY

Observations on soldiers indicate that those not supplied with alcoholic drinks are able to march farther and are in better condition at the end of the day than those to whom it has been given. Concerning its use a leading athletic coach of the country says:

> Liquor and athletics just don't go together. There isn't a responsible coach in the country who tolerates drinking when men are in training. I've seen promising athletes fade out of the picture because they got to drinking between training seasons. Even "pro" athletes have to fight shy of liquor if they want to stay at the top. Every once in a while you read about some "pro"

**who has gone down the skids because of drink. For every chance that a fellow who starts drinking in college can come through all right, there are too many chances that he will come to grief.[2]**

## SOCIAL AND ECONOMIC EFFECTS OF ALCOHOL

No consideration of the effects of alcohol upon health is complete without brief mention of the moral, social, and economic aspects of the problem. The saloon in which the workingman squanders his weekly pay is certainly at least a contributing factor to the poverty, the malnutrition, and the illness of his family which results therefrom. Various studies have shown that illness, death, and delinquency rates among children in such homes are many times higher than among children whose parents provide them with decent, wholesome living conditions. The young man whose vision of the sordid nature of prostitution is dulled by alcohol all too frequently discovers to his sorrow that he has contracted syphilis or gonorrhea, and many a girl takes her first step on the road to sex delinquency when under the influence of liquor.

Still more important than these effects of alcohol upon physical health are its effects upon mental health. Rare indeed is the child who can grow up with a normal wholesome attitude toward life in a home in which one or both parents are intemperate drinkers. The drunken father bullies his children and inspires in them both fear and disgust. Alcohol always has had a disorganizing influence upon the family and is responsible for more family conflicts and broken homes than any other single cause. Probably every reader knows personally of promising young men whose careers have been wrecked and whose homes broken because of drink. In the past drinking, at least to excess, was confined largely to men. What the end results of the modern competition of women in this regard will be only time will tell.

## RESISTANCE TO DISEASE

It has long been an impression of physicians that pneumonia is particularly common and serious among heavy drinkers. This observation finds support in laboratory experiments which show

[2] From *Allied Youth*, p. 4, October 28, 1936.

that rabbits are rendered more susceptible to pneumococcus and streptococcus infections by hypodermic injections of alcohol or ether.

### DISEASES CAUSED BY ALCOHOL

Concerning alcoholism the distinguished Sir William Osler wrote that when a large amount of alcohol is taken the effect is chiefly upon the nervous system and is manifested by muscular incoordination, mental disturbance, and narcosis. The face is flushed, the pulse full, the respiration slow and deep. Unconsciousness is present but rarely so deep that the patient cannot be aroused. Muscular twitching may occur but rarely convulsions.

Dr. Osler cites the following as the chief effects of the continued use of alcohol in appreciable quantities.

*Nervousness*, as evidenced by unsteadiness of the muscles, tremors of the hands and tongue. The mental processes may be dull, particularly in the early morning hours. Irritability of temper, forgetfulness, and a change in the moral character gradually come on. Judgment is seriously impaired, the mind enfeebled, and in the final stages dementia may supervene. Epilepsy and neuritis may result from chronic drinking.

*Stomach symptoms*, commonly described as "catarrh," are frequent. The appetite is usually impaired and the bowels constipated. The toper has a furred tongue, heavy breath, and in the morning a sensation of sinking at the stomach until he has had his drink.

*Cirrhosis of the Liver.* Alcohol produces definite changes in the liver, leading ultimately to a form of hardening or cirrhosis. There are cases in which comparatively moderate drinking for a few years has been followed by cirrhosis; on the other hand, the livers of persons who have been steady drinkers for 30 or 40 years may show only moderate grades of cirrhosis. For years before cirrhosis develops, heavy drinkers may present an enlarged and tender liver, with at times swelling of the spleen.

The *kidneys*, the *heart*, and the *arteries* also may show definite degenerative changes from alcoholism.

*Delirium tremens* is a type of psychosis, or insanity, resulting from the long-continued action of alcohol on the brain. A spree by an habitual drinker is likely to bring on an attack. At the outset of the attack the patient is restless and depressed and sleeps badly, symptoms which cause him to take alcohol more freely. After a day or two the characteristic delirium sets in. The patient talks constantly and incoherently; he is incessantly in motion and desires to go and attend to some imaginary business. Hallucinations of sight and hearing develop. He sees objects in the room, such as rats, mice, or snakes, and fancies that they are crawling over his body. The terror inspired by these imaginary objects is great and has given the popular name "horrors" to the disease. Approximately twenty-five thousand persons per year are being admitted to state psychopathic hospitals with diagnoses of acute or chronic alcoholic psychoses. Many more are cared for in general hospitals and by private physicians. About 10 per cent of these patients die during an acute attack. The others recover, but recurrence is almost the rule if drinking is continued.

## ALCOHOL AND THE LENGTH OF LIFE

The combined experience of 43 American life insurance companies over a period of 25 years shows that the death rate among "very moderate drinkers" is 18 per cent higher than the rate among insured lives generally, 50 per cent higher among those who had a history of past intemperance, and 86 per cent higher among steady but so-called "moderate drinkers." The "very moderate drinkers" used two glasses of beer or one glass of whisky daily, and the steady "moderate drinker" more than two glasses of beer or one glass of whisky daily but were accepted as temperate and standard risks.

## ALCOHOL AND VENEREAL DISEASE

One who acts as a health adviser to young people again and again hears the story that illicit sexual relations were engaged in and venereal disease contracted while under the influence of alcohol. The director of the Student Health Service of one of

our large universities reported that practically every student who contracts venereal disease does so while under the influence of alcohol.

Alcohol also aggravates existing venereal infection, impedes the progress of cure, and reactivates quiescent infections. Knowing this, the physician prohibits alcohol, even in small amounts, to patients under treatment.

### THE PROS AND CONS OF ALCOHOL

As a medical and health problem, alcoholism is exceedingly widespread and serious. A study estimates that there are 3,700,000 "excessive drinkers" in this country, exclusive of the many millions of "social drinkers" who can "take it or leave it alone." About 60 per cent of the "problem drinkers" are mentally ill to start with; that is, with them drinking is a symptom rather than a cause of the illness. For the other 40 per cent, the trouble starts with drinking; some with social drinking, others with compensatory, occupational, or situational drinking.

When all the facts are assembled, most of the entries concerning alcohol are on the debit side of the ledger. It shortens life, produces certain specific diseases, lowers physical and mental efficiency, weakens judgment, and destroys discretion. But, you say, these are the results of excessive amounts of alcohol—the results of intemperance. What about its occasional use in moderation? On this point we have less definite information. It may be entirely harmless. Certainly there is no specific evidence that it is deleterious. But can its use be kept occasional and moderate?

On the other side of the ledger we find that alcoholic beverages add delectability to a dinner, stimulate the appetite, engender conviviality, and afford release from care. A good wine adds materially to the pleasure of those who truly appreciate it. To them it is sacrilegious to debase it by intemperate use.

Of alcoholic drinks light wines are the usual choice of the connoisseur and are least likely to be injurious. Their alcoholic content varies from 7 to 10 per cent but there is little likelihood of using them to excess. Beer contains less alcohol but tends to

be fattening and is more likely to be used in increasing amounts. The distilled liquors, such as whisky, brandy, and gin, have high alcoholic content and are responsible for most drunkenness and habitual intemperance.

### A PERSONAL DECISION

At some time in life everyone is confronted with the question: What shall be my attitude toward liquor and what course shall I follow? It has been well said that "the most important thing about liquor is that it shall be unimportant." Let us be unemotional about it, acquaint ourselves with the available facts, decide how much real pleasure it holds, count the cost, estimate the hazards, and make an intelligent decision. Above all, let us not be coerced into the use of alcohol by the advertising of the liquor interests which suggests that to use it is the only socially acceptable course to follow.

On most college campuses a few years ago it was decidedly the "smart" thing to drink. Today this is much less true and most students consider drunkenness something to be ashamed of. Some persons who drink to excess do so because they are miserable and hope to escape the realities of life; others because they are trying to compensate for feelings of inferiority by demonstrating that they can "drink with the best of them"; others because they wish to be good fellows and believe that one drink after another is the way to do so; and still others—and most habitual drunkards belong in this group—because of an inherent weakness of character. None of these reasons for excessive drinking is consistent with good mental health.

Many do not care for alcoholic beverages; others for economic, social, or personal reasons decide to forego them. Still others are unable to keep the use of alcohol within the bounds of moderation. To all of these the only sound advice is to avoid it entirely.

If, on the other hand, the moderate use of alcohol adds materially to one's pleasure or happiness, if its use can be a pleasant occasion instead of a controlling habit, if "one can sip the cup but not drain it," if it can be kept one's servant instead of becoming one's master—then it may be used with little if any

danger to health, then it may be worth the risk, and then and only then can it justifiably have a place in one's life.

## Narcotics

Literally, narcotics are drugs which produce sleep. These include opium, morphine, and their derivatives, and the barbiturates. Practical usage, however, includes as narcotics other habit-forming drugs, such as cocaine and cannabis (marijuana).

Few if any drugs are more valuable than those which relieve pain and produce sleep. Yet opium and its derivative morphine are responsible for most of the drug addiction in the world today. Other important habit-forming drugs are heroin, cocaine, marijuana, and the barbiturates. Alcohol is also narcotic (sleep-producing) and habit-forming but it is considered in a separate category.

### NARCOTIC ADDICTION

Opium addiction, in the form of opium smoking, has been known for centuries in the Orient. In this country the seriousness of opium addiction was not recognized until early in the present century. As late as 1909, 118,000 pounds of opium were legally imported and distributed for smoking purposes in the United States.

In 1914 Congress passed the Harrison Narcotic Act. Under this law all dispensaries of opium, morphine, cocaine, and their derivatives are required to be licensed and registered, to keep an accurate and permanent record of all drugs received and disposed of, and to dispense these drugs only for medicinal or scientific purposes. This law is intended to prevent the improper use of these drugs. To a great extent it does this, but there has always been an illicit trade or "black market" in these drugs. Some are smuggled into the country; others are produced or sold illegally. Although the prices charged are unbelievably high, the craving of the unfortunate addict causes him or her to pay any price or sacrifice anything to obtain these drugs.

When the Harrison Narcotic Act was passed it was estimated that there were 150,000 to 200,000 narcotic addicts, mostly

women, in this country. According to a more recent estimate the addicts in this country now number about 48,000, mostly men—approximately 1 addict per 3,000 population. This reduction has been largely due to the vigorous enforcement of the Harrison Narcotic Act and to the provision of federal hospitals for the treatment of addicts. It is estimated that one-third of all addicts acquire the habit before the age of twenty and two-thirds before the age of thirty years.

Physicians are very cautious in the administration of narcotics, with the result that less than 5 per cent of addicts develop the habit as the result of proper medicinal use. The other 95 per cent acquire the habit from associates or "peddlers."

*Opium.* Opium is derived from the juice of unripe seed capsules of the poppy plant, *Papaver somniferum*, a native of Asia Minor. The dried juice forms a brown gummy mass which is used for smoking; powdered, it becomes the drug opium. From opium are extracted by chemical processes morphine, codeine, papaverine, and several other drugs. Of these by far the most important is morphine. Morphine in small doses deadens pain and produces sleep. For these purposes it is invaluable, yet, even when used medicinally, the dangerous habit-forming properties of the drug must never be forgotten. Investigators are constantly attempting to find or produce a drug which will have the beneficial effects of morphine without its addictive possibilities. Closely related to morphine chemically is codeine. Codeine has much less narcotic action than morphine and little addictive possibilities. Heroin, on the other hand, which is also closely related to morphine and derived from it, is the most dangerous addictive drug known. When first produced, it was thought to be less habit-forming than morphine, but experience indicated a very different situation. It is estimated that 75 per cent of the addicts use heroin. The dangers of this drug caused the Federal Government several years ago to forbid both its manufacture and its sale in this country.

*Cocaine.* Cocaine is obtained from the leaves of the coca tree, a native of Peru and Bolivia. For many years the Indians of these countries have chewed the leaves of these trees for

stimulation and to decrease fatigue. The alkaloid cocaine is obtained from these leaves.

Medicinally, the most important action of cocaine is its ability to block nerve conduction by local application. For this reason it is used as a local anesthetic for certain operative procedures. For most purposes cocaine has been replaced by substitutes, such as procaine or novocain, which are less toxic and not habit-forming. The toxic effects of cocaine are so unpleasant that there are few pure cocaine addicts.

Addiction to cocaine is based not upon its anesthetic effects but upon the stimulation of the central nervous system which it causes. The first effects are garrulity, restlessness, and excitement. The sense of fatigue is diminished and the addict greatly overestimates his muscular and mental capacity. Hallucinations and ideas of persecution, mental deterioration, digestive disorders, emaciation, and sleeplessness are common. Most addicts take the drug by injection although many inhale a cocaine powder that is commonly called "snow."

*Marijuana*, or hashish, is obtained from the flowering top of Indian hemp, *Cannabis indica*, a plant which grows wild in many parts of the world, including the United States. Hemp is used commercially for the manufacture of twine, rope, bags, and clothing. The drug cannabis has no medicinal value but is habitually used for its psychic effect by millions of people in all parts of the world. It is either smoked as "reefer" cigarettes, chewed, or drunk.

This drug produces a dreamy state of partial consciousness in which the subject's ideas are disconnected and uncontrollable. Addicts, most of whom are maladjusted adolescents, may have a feeling of well-being, exaltation, and excitement; or may sink into a depression or panic state. Delirium may ensue. Violent acts have been committed under the influence of this drug. Continued use of the drug results in mental deterioration.

***Barbiturates.*** The barbiturates, which are sold under various trade names such as Luminal, Amytal, Seconal, Nembutal, etc., are habit-forming for some persons. Taking them because of sleeplessness and nervousness, subjects may become dependent

upon these drugs somewhat as they become dependent upon alcohol or the opiates. Self-medication with these drugs is therefore inadvisable. Approximately two-thirds of the states have passed laws preventing the sale of barbiturates except upon a physician's prescription.

### CAUSE OF ADDICTION

Narcotic addicts as a group are emotionally immature, childlike persons, who never have made a proper adaptation to the problems of living. They experiment with the use of these drugs for adventure, for the pleasant sensation supposed to ensue, for the relief of fatigue, or for escape from reality. Most normal individuals find the results disappointing and unpleasant, but a few weaker ones have taken their first steps toward addiction. Little do they realize how the first few steps take them on a downward path from which there is no turning back.

Once addiction is established the victim is no longer his own master. These powerful drugs give rise to an abnormal craving which will not be denied and which can be satisfied only by more of the drug. No matter what the cost in money, reputation, or professional advancement the drug addict must have his customary doses of narcotics. If the supply is interrupted, the addict becomes virtually insane and will sink to poverty or crime to satisfy his craving. Withdrawal causes such severe suffering that few addicts have the moral courage and strength to discontinue the habit. Over 50 per cent of the inmates of corrective institutions in New York City are drug addicts and 90 per cent of that number are young people. Every young drug addict is a potential criminal.

### PREVENTION OF ADDICTION

Law enforcement and education are the two most effective measures for the prevention of drug addiction. Confirmed addicts need hospital treatment. The U.S. Public Health Service provides this treatment in special hospitals for narcotic addicts. To be admitted, the individual patient must make application to the Surgeon General of the U.S. Public Health Service.

Efficient enforcement of the narcotic laws and apprehension of those engaged in the illicit traffic of narcotic drugs will eliminate the availability of the drug to both confirmed and potential addicts. Public appreciation of the seriousness of the problem is necessary for such law enforcement and control.

Education of boys and girls concerning the illicit traffic in drugs and the dangers of addiction will prevent many of them from taking that first ill-considered step toward addiction. This, combined with the development of wholesome social interest and activities, will eliminate the clubs and dens of narcotic users and marijuana smokers.

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## *Chapter* VIII

# EXERCISE—FATIGUE—REST

The advice for keeping fit most frequently given by physicians and laymen alike is plenty of sleep, an adequate but not excessive diet, and regular, moderate exercise and recreation. There are people who are healthy with little or no exercise, but the vast majority of us feel better, sleep better, and get more fun out of life if we take regular exercise and enjoy some recreational sport.

### The Effects of Exercise upon the Body

The most obvious effect of regular exercise on the body is an increase in muscular development. Soft, flabby muscles become hard and firm. This improves personal appearance and enables one to enjoy physical recreation.

More directly related to health, however, are the effects of exercise upon the general metabolic processes of the body. The rate and the force of the heartbeat are increased, breathing becomes deeper and more rapid, and heat production and perspiration are increased.

The energy to support exercise is derived from the oxidation (burning) of food substances, largely carbohydrates and fats. This results in better appetite and improved elimination, and in children a stimulation of growth.

One occasionally hears the term "athletic heart" but even

physicians do not know exactly what it means. In fact, investigations of the subject have led to the conclusion that there is no such thing as athletic heart.

The heart is a muscular pump which, like other muscles, tends to enlarge as a result of strenuous work. The hearts of very active animals like the squirrel and rabbit are relatively larger in proportion to body size than the hearts of less active animals. On the other hand, this enlargement is merely muscular development and is in no sense an evidence of damage.

This muscular pump of ours performs enough work every 24 hours to lift a weight of 10 to 15 tons to a height of 5 to 6 feet; and it keeps this up day after day, year after year. Furthermore, on many occasions it is suddenly called upon to increase enormously the amount of work which it is doing. Hence, it is of vital importance to keep the heart in as good condition as possible at all times. Moderate exercise will aid in this and so is beneficial rather than detrimental.

### EXERCISE TO REDUCE WEIGHT

Exercise increases the combustion of carbohydrates and fats and so is frequently advocated for the reduction of weight. In principle this is reasonable, but the difficulty arises from the fact that exercise also stimulates the appetite and so leads to an increased consumption of food. To be effective in the reduction of weight, exercise must be combined with dietary control. Exercise alone is futile.

### EXERCISE AND LENGTH OF LIFE

Some years ago Dr. Pearl[1] reported that an analysis of the mortality statistics of Englishmen, the most comprehensive and accurate in existence, shows a direct and positive relationship between the expenditure of physical energy as indicated by occupation and the age at death. This means that, after deducting deaths from accidents and from hazards peculiar to the various occupations, a high death rate tends to be associated

[1] Pearl, Raymond, "Studies in Human Biology," Williams & Wilkins Company, Baltimore, 1924.

with those occupations which involve hard physical labor. This relationship prevails whether the labor is performed chiefly indoors or outdoors.

Another very different approach to this problem was made by Dr. Pearl[2] under the controlled conditions of his laboratory when he observed the relation of the length of life of a species of flies to their activity. From this study he concluded that the more rapid the rate of energy expenditure the shorter the duration of life. In other words, the length of life varies inversely with the rate of living.

### PHYSICAL FITNESS AND NATIONAL EMERGENCIES

Whether or not physical exercise is essential to good health or longevity in normal times, there can be no question as to the importance of physical fitness in times of war or preparation for war. An individual whose muscles are soft and whose physical endurance is low may be just as healthy, live just as long, and even be just as efficient in a sedentary business or professional occupation as one who keeps himself physically fit, but he is in no condition to serve his country either in the armed forces or in essential defense industries. A national emergency places upon every citizen, and particularly upon men and women of college age, a deep personal obligation both to himself and to his country in the matter of health and physical fitness.

Recognizing this, many colleges and universities are providing special programs and facilities to assist their students to meet this obligation. Physical examinations, tests of physical fitness and of one's knowledge of the essentials of personal and group hygiene are offered. On the basis of these findings personal advice is given, facilities for the correction of physical defects are made available, and individualized programs of physical activity and instruction are provided. It is the moral responsibility of every physically qualified student to avail himself of this opportunity to make himself physically fit for the service which he may be called upon to render in the service of his country.

[2] Pearl, Raymond, "The Rate of Living," Alfred A. Knopf, Inc., New York, 1928.

## A RATIONAL RECREATION PROGRAM

Whether or not exercise improves the health or adds to the length of life, it is common experience that a certain amount of regular exercise contributes to a feeling of well-being. Furthermore, exercise which involves play and recreation, and relieves nervous tension and mental fatigue in so doing, is not only pleasant but beneficial.

How much and what kind of exercise one should take merit careful consideration. The growing child and the normal young man and young woman thrill with the exhilaration of strenuous sports. They fatigue to the point of exhaustion but recover promptly with a period of rest. But not so with those of middle age and beyond. For them moderation is of vital importance. Just how much exercise a person of a given age can safely take it is impossible to say. Individual variability is too great to permit of generalization. A game of tennis may be perfectly safe for one person of forty but folly for another. The safe limit for exercise depends upon the condition of the heart, the condition of the muscles, the type of exercise, and the regularity with which it is taken. Two general suggestions, however, will serve as sound advice for anyone. The first is to determine periodically the condition of the heart and general health by careful, thorough physical examinations, administered by a physician. The other is to keep the exercise below the point of physical exhaustion. A sense of pleasant relaxation or moderate fatigue after exercise is desirable, but exercise to the point of extreme fatigue may do serious damage and is likely to be more deleterious than no exercise at all.

The type of exercise to be preferred depends upon one's physical condition. Young people can safely enjoy vigorous competitive sports such as tennis, handball, and squash, but most older persons do better to limit themselves to less strenuous activities. Walking, golf, swimming, sailing, skating, and horseback riding are among the sports that one can enjoy and safely participate in throughout life. To be of greatest benefit, physical activities should involve recreation as well as exercise and take one out of

doors into the fresh air and sunshine. Regularity is important if one is to get the most enjoyment and benefit out of exercise.

## HOW TO KEEP PHYSICALLY FIT

Physical fitness implies freedom from disease, functional as well as organic, muscles that are in condition to perform the work that they may be called upon to do, and a mental attitude that makes for effective functioning of the body as a whole.

Organic disease cannot be cured by exercise; in fact in certain diseases exercise is contraindicated. On the other hand, functional diseases, such as spastic bowel and certain types of headache and nervousness, which are aggravated, if not actually caused, by the pressure and tensions of modern life, may be relieved by tennis, golf, badminton, bowling, horseback riding, skating, fishing, etc. Most valuable are sports that involve interest to take one's mind off problems and worries and exercise to stimulate the vital processes of the body and produce relaxation and fatigue.

Furthermore, sports that combine fun and exercise, companionship and recreation are most likely to be continued as one grows older. College students have an opportunity that will never be repeated to acquire sufficient skill in various sports to enable them to enjoy and profit by these sports for years to come.

*Setting-up Exercises.* In the modern physical education program formal exercise drills have been largely replaced by recreational sports. There are times, however, when it is difficult or impossible to get even an outdoor walk. And there are muscles, particularly of the abdomen and back, which should have more exercise than they receive in most recreational sports. For these reasons the "daily dozen" is offered (see posture exercises, page 150).[3]

## POSTURE AND PHYSICAL FITNESS

Good posture is an asset to any man or woman, boy or girl. It improves personal appearance, and suggests poise, self-

[3] See also Tunney, Gene, "It's More Fun to Be Fit," *The Reader's Digest*, vol. 40, p. 17, February, 1942.

confidence, health. Many an applicant for a position makes an unfavorable first impression because of poor posture.

The importance of posture to health has been grossly exaggerated, but after all the chaff has been blown away there still remains a distinct relationship between the two. Stooped shoulders and exaggerated spinal curvatures throw extra strain upon the muscles of the legs and back. A protruding abdomen permits sagging of the abdominal organs which in turn interferes with function. All of this predisposes to fatigue, and fatigue in turn predisposes to poor posture; hence, a vicious cycle is set up.

The makers of kidney pills have succeeded in associating backache and kidney disease in the minds of most people. In reality true kidney disease is rather rare, and when it does occur it is almost never accompanied by backache. On the other hand, backache, which is common, is usually due to poor posture or flat feet or both. Relief is obtained not by taking kidney pills but by correcting the cause of the trouble.

Poor posture may be due to heredity, to habit, to fatigue, to poor development and use of the muscles of the back, abdomen, and legs, or to a combination of these factors. For the improvement of posture, exercise is usually recommended, but interest, mental attitude, and rest may be of equal importance. Certainly when fatigue is a major factor in poor posture, rest is of greater value than exercise. However, proper exercises are also necessary to develop the muscle strength and tone required to maintain good posture.

Whatever the cause of poor posture, the chances of correcting it are greatest in childhood and decrease progressively with age. The habits of children are still in a formative stage, their ligaments and muscles are still adaptable, and their bones not completely calcified.

## POSTURE EXERCISES

The exercises which are useful to improve posture are particularly those which tend to strengthen the muscles of the

back and abdomen. Some simple exercises to accomplish this are as follows:[4]

1. *Lying on the Back; Hands Back of Neck.* Take a deep breath and raise chest high; keep chest up and exhale by pulling abdomen in hard.

2. *Same Position; Knees Bent, Feet Pulled Up.* Pull abdomen in hard and then relax part way; also done standing with hands clasped on top of head.

3. *Sitting in a Chair; Trunk Bending Forward.* Incline trunk forward from the hips, keeping spine straight. This is the position which should be taken when bending forward to write or to do any other kind of desk work. The absence of the lowered chest and rounded back and shoulders of the incorrect position is striking. This exercise may be done standing.

4. *Standing; Abdominal Retraction.* Stand with the heels four inches away from the wall, but with the hips, shoulders, and head touching the wall; flatten the lower part of the back against the wall by pulling in the abdominal muscles. This causes a downward rolling motion in the lower part of the back and flattens the lumbar curve. Holding this position, come away from the wall with the weight well forward on the balls of the feet. This suggests the correct standing position, but it should be held in a graceful, flexible manner.

5. *Standing; Leg Raising.* Stand with hands on hips, back flat and chin in; raise leg forward without bending the knee; lower it; repeat with other leg. This exercise teaches how to hold the back flat while balancing the body and doing a leg exercise.

6. *Carrying the Head Forward, Clasp Hands behind the Head.* Force the head back against their pressure, keeping chin in. This strengthens the muscles of the back of the neck.

7. *Spinal Curvatures.* "Stand tall," holding the back straight—Rise on the toes with the arms extended forward and up, stretching the arms and the body.

8. *Distended Abdomen.* This condition may be successfully prevented and largely overcome by doing Exercises 2 and 4.

## PAINFUL ARCHES

Our lowly, misused, misshapen feet are at last coming into their own. A doctor in Canada and imitators in various parts of this country have claimed to "cure" all sorts of human ills merely by twisting the foot—and "pulling the leg." Sufferers flocked to this little Canadian village from all over the country, and many came away benefited. But they were helped, not by the foot twisting, but by their faith in the quackery and by a better fitting pair of shoes than they had before.

[4] Quoted with permission from "Standing Up to Life," Metropolitan Life Insurance Company, New York.

As a matter of fact, painful feet are responsible for an enormous amount of backache, headache, fatigue, nervous irritability, and other related disturbances. The prevalence of arch trouble is suggested by the enormous number of so-called "corrective" shoes on the market. Some of these are beneficial, but a shoe salesman is hardly a dependable health adviser.

That the problem is not merely one of shoes or of exercise is shown by the following quotations from the Metropolitan Life Insurance Company's pamphlet on this subject:

#### CORRECT POSITION OF FEET IN STANDING

Most foot troubles come from an improper use of the feet in standing and walking—sometimes an incorrect posture is taken because of the pressure of an uncomfortable shoe, sometimes because of carelessness or ignorance.

In standing, point the feet straight to the front and place them from two to four inches apart. Support the weight on the outside of the feet. Frequently remind yourself of this correct position while standing by "gripping the floor" with all the toes. This exercise lifts the long arch and places the whole foot in a correct position. Standing for a long time in this position is less tiring than when the feet are turned out or the ankles are allowed to bend in.

#### FAULTY SHOES CAUSE FOOT MISERY

Shoes should be so made that the inner edge of the sole is straight. When the inner edge of the sole curves toward the middle of the toes, it crowds the toes and forces the great toe into an unnatural position. Shoes should be long enough and wide enough for the toes to lie straight and slightly separated. They should be roomy over the toes, and fit snugly around the heel and over the instep.

Take plenty of time when buying shoes. Try on both shoes of a pair. Shoes may seem to be comfortable when you stand with your weight distributed upon both feet, but when you throw all the weight upon one foot, the shoe may feel quite different, and you may find it not at all comfortable.

Some women say they must wear high heels to be comfortable. Yet high heels are undoubtedly the cause of many sore feet, aching backs and touchy tempers. They are frequently the cause of the falling of the front arch, painful calluses, contracted toes and corns.

High heels tend to tilt the body forward unnecessarily in standing and walking. When that is done, the body must use muscular effort to hold itself upright. In doing so, the spine may be curved unnaturally and the abdominal organs thrown out of place.

Some persons may be able to wear high heels all their lives without injury or discomfort. Others may go for many years apparently unharmed. But usually

a time comes, during or after middle life, when both feet and body rebel against unnatural treatment, and ailments of many kinds develop.

If a woman persistently wears high heels, the muscles at the back of her leg will grow short from lack of use. Then, if she tries to come down suddenly to sensible heels or to tennis shoes, she will feel a tremendous strain upon the heel cord. In such cases, relief may be had by going back to the higher heels and coming down gradually to the lower.

### ARCH TROUBLES AND THEIR CAUSES

The most common foot ailment is that known as "fallen arch," "flatfoot" or "weakfoot." It is the flattening of the long arch that extends from the heel to the great toe. One of the first symptoms is a pain under the arch and up the back of the leg. There is a change also in the print made by the wet foot. The normal footprint is narrow in the middle and wide at the heel and at the toes. The flat foot leaves a footprint that is almost the same width through its entire length.

Some persons are born with flat feet, and apparently suffer no distress from them, unless called upon to do an unusual amount of foot work. Persons whose feet become flat, however, feel various pains and aches, become extremely tired after a little walking or standing, and their ankles tend to bend in.

As implied earlier, one of the causes of flatfoot or fallen arch is toeing out. Another is improper shoes; another, lack of exercise for the foot muscles.

A very painful condition of the foot is the flattening of the anterior or metatarsal arch, which extends across the ball of the foot from the base of the great toe to the base of the little toe. At this point, specialists say, 90 per cent of the foot troubles of women are to be found.

The first warning of an unnatural condition of this arch is pain in the three outer toes and directly under the ball of the foot. Another sign is a painful callus in the middle of the ball of the foot. Such a callus shows that there is irritation in this particular spot, resulting from the arch having dropped.

This trouble is frequently due to a sole that bends down under the ball of the foot and bends up at the sides. This allows the short front arch to drop. The pain may be relieved to some extent by changing to shoes with soles that are flat. A spot of thin padding, about the circumference of a half-dollar, under the ball of the foot, placed slightly back of the center of the arch; or a band of rubber webbing or adhesive plaster bound around the foot, back of the arch, may give relief.

A doctor with special experience in treating feet is needed for foot troubles. It is not wise to buy various arches and supports or special shoes without the advice of a doctor or an orthopedic specialist.

The feet, including the toes, are made for walking. With the growing use of the automobile, and with elevators to take the place of stairs, men and women are walking less and less, thereby frequently causing the foot muscles to become

flabby and various foot troubles to develop. Walking in comfortable, well-fitted shoes is one of the best ways to keep the feet healthy. For curing foot troubles, special exercises are often prescribed by the physician.

## Fatigue

Fatigue is familiar to all mankind. In moderate degrees it brings pleasant relaxation and serves as nature's best sleeping potion. Excessive fatigue, on the other hand, results in nervousness, restlessness, and insomnia. "The man who said 'the harder the toil the sweeter the rest' was never profoundly tired."[5]

The sensation of fatigue is really a sensation of pain, produced by the action of certain toxic products upon the nerve centers of the brain. These toxins may be produced in the muscles as a by-product of the oxidation of food substances to supply energy for the support of physical activity; they may be the toxins from a general or a localized infection in the body; or they may be absorbed from the digestive or respiratory tracts. But whatever their source, they enter the blood stream and are circulated throughout the body, modifying activities and producing sensations far removed from their point of origin.

Muscular fatigue from physical activity is first recognized as a sensation of moderate discomfort, but if the activity is continued this gradually develops into true pain, which eventually becomes so excruciating that the continuation of the activity is impossible. In fact, fatigue may well be considered a protective mechanism, for pain causes cessation of muscular activity before the muscles are completely exhausted. Evidence of this is the fact that electrical stimulation will cause a muscle to contract after the limit of voluntary contraction has been reached.

### ACUTE AND CHRONIC FATIGUE

Acute fatigue is the inevitable result of severe physical or emotional activity. The condition of health and of physical training influences the susceptibility to fatigue and the rate of recovery. Children fatigue more easily than adults but also recuperate more quickly. Extreme fatigue is never beneficial and may be deleterious, particularly to older persons.

[5] John Muir.

Various acute infections, such as influenza, tonsillitis, and colds, cause fatigue very similar to that produced by physical activity. Recovery from this fatigue is usually prompt after the termination of the infection.

Chronic fatigue is a different story. It lowers vitality day after day, week after week. Rest gives temporary, but only temporary, relief, and life hardly seems worth the effort. Such fatigue is evidence of ill-health.

It is common knowledge that tuberculosis may cause chronic fatigue; but so also may sinus infection, diabetes, heart disease, and a host of other diseases. A diet which is inadequate in proteins, vitamins, or certain minerals results in fatigue even though its energy content is sufficient. Eyestrain, constipation, indigestion, painful feet, poor posture, disturbances of certain glands of internal secretion, and nervous instability and emotional strain are among the other common causes of chronic fatigue.

### THE EFFECTS OF FATIGUE

The most striking effects of fatigue are upon the nervous system, where it produces irritability, nervousness, restlessness, and insomnia. Trifles become disturbing; enthusiasm is gone; attention distracted; judgment warped. The whole world looks drab. The most amiable disposition is ruined by it. Child specialists tell us that many behavior problems in children are due to nothing more or less than fatigue.

There is considerable evidence that fatigue lowers resistance to disease. And it very definitely interferes with recovery from infections. The death rate from influenza is highest among those who refuse to "give up," and the patient with tuberculosis who tries to build up his health by physical exercise, even in the out-of-doors, is throwing away his chance for recovery.

### RELIEF OF FATIGUE

For the relief of fatigue one thinks first of rest. And rest, physical and mental, is important; but unfortunately even for fatigue there is no panacea.

Fatigue is only a symptom which will disappear when the

basic trouble is corrected. Therefore, the starting point for relief of chronic fatigue should be a determination of its cause. If this happens to be diabetes or sinus infection or faulty nutrition, medical science has a definite solution to offer. If painful arches are at the bottom of the trouble, proper shoes and exercises will give results. If one's job is monotonous, physical and mental efficiency will be improved by making a change in jobs for part of the day. If worry or nervous tension is the inciting cause, a game of bridge, an engrossing book, a good play, or a game of golf is the best treatment.

The drugs which are used for the relief of fatigue may be divided into two groups: those which depress sensation and so lessen the feeling of fatigue, and those which stimulate the higher nervous centers to carry on in spite of fatigue. The former group is made up primarily of alcohol and the narcotics, such as morphine and cocaine and their derivatives. Alcohol may cause a temporary diminution in the sense of fatigue, but this is followed by even greater fatigue and depression than existed before. Morphine and cocaine depress sensibilities but are dangerous habit-forming drugs which should never be used except under the direction of a physician. The federal narcotic agents tell us that it is common practice for narcotic peddlers to employ accomplices who offer these drugs to their boy and girl associates to "give them a lift" from the fatigue of the day's work so that they can enjoy the evening's fun. The narcotic peddler gets his "pound of flesh" by draining the very life blood out of those who become addicts.

Caffeine has long been used as a stimulant to offset fatigue, and, except for the nervousness and insomnia which it causes in some persons, no known ill effect results from its use. The same cannot be said for the so-called "pep pills"—benzedrine sulphate tablets—which are coming into use by students, particularly when studying for examinations. These tablets are more powerful stimulants than caffeine but they make some persons so nervous and jittery that they are unable to sleep or do concentrated work for several days. A few serious toxic results have been reported from their use.

Clearly, the attempt to obtain relief from fatigue by drugs, either depressant or stimulating, is unsound. Fatigue is nature's warning that rest is needed. To silence this warning signal or to whip one's body along in spite of it can only lead to catastrophe.

## Rest

Facilities for exercise abound on every hand. Nearly every community has its gymnasium and its playground. Great national organizations, educational institutions, and even governments support athletic programs. Some industries and department stores operate rest and relaxation rooms for their employees. But who ever heard of providing a place for rest and relaxation for the general public? The very suggestion seems fantastic. Yet how many weary, footsore people are crowded into the business districts of our cities every day—people for whom a few moments of relaxation would give life a different hue; people who need rest, not exercise?

Industries, studying the work records of employees throughout the day, find that efficiency declines toward the latter part of the morning, improves after lunch, and then declines again more rapidly in the afternoon. They find also that accidents are most frequent during the periods of accumulating fatigue; and that 15-minute rest periods in midmorning and midafternoon result in increased efficiency which more than compensates for the time "wasted."

Many individuals have made similar discoveries concerning their own well-being. One of the most famous surgeons in the world long made it an inviolate rule to have a 15- or 20-minute rest each day after lunch. No matter where he was or how pressed for time, he slipped away for a brief doze and returned refreshed. This practice of relaxation undoubtedly was an important factor in the maintenance of his health and vitality through many years of a strenuous and useful life.

The habit of relaxation is worth cultivating. A few minutes on a davenport or comfortable chair with the eyes closed, the mind at rest, and every muscle relaxed will do much to conserve

physical and nervous energy. At first complete relaxation probably can be attained for only a few minutes at a time but this should be increased to at least 10 or 15 minutes once or twice a day.

The time may come when we shall have rest clubs as well as athletic clubs, but not yet. We are still too much inclined to boast of the small amount of rest on which we can get along. We still cling to the mad desire to get everything done in a day. To entice the average American to rest in the daytime one must camouflage the rest with mysterious measures such as light treatments, massage, or sun bathing. Possibly when as a nation we have grown up, we shall learn, as many of the old-world countries have learned, to take life more leisurely, to get a little more out of life as we go along, with a friendly chat and a cup of tea to break the tension of the day.

## Sleep

From birth until death the body is never completely at rest. Energy expenditure goes on even during sleep. On the other hand, sleep is the nearest one ever comes to absolute rest. It is the time when the body's stores of vital energy are replenished. This respite from activity is essential to life. The longest that anyone has been known to live without sleep is not quite ten days. Laboratory animals deprived of sleep die of exhaustion.

The intensity of sleep varies throughout the night, being deepest during the second and third hours and then becoming progressively lighter until waking. Noises, excitement, worry, and dreams affect the restfulness and diminish the benefits of sleep.

It is familiar knowledge that most deaths occur during the early morning hours. This is the time when vital processes, as indicated by temperature, metabolism, blood pressure, and heart action, reach a low point. Hence, it is easily intelligible that the spark of life should succumb to exhausting diseases at this time.

For years it had generally been supposed that restful sleep

was quiet and relatively motionless. "Sleeping like a log" implied a perfect night. Ingenious scientists, however, who devised instruments and cameras to record and photograph every movement of the sleeper, tell us that a sleeper rarely remains in one position for more than 10 to 15 minutes at a time. He shifts his arms and legs; he tosses and rolls at intervals all night.

The hours of sleep necessary to relieve fatigue and restore physical and nervous energy vary with many factors, such as age, the degree of fatigue, the state of general health, and nervous and emotional control. The infant under one month of age sleeps from 21 to 23 hours a day. The average two-year old needs 12 hours of sleep at night and 1 to 2 hours of nap. The child of six to eight years requires approximately 11 to 12 hours of sleep. The boy or girl from thirteen to fifteen requires from 9 to 10 hours. For the average person of middle age the normal requirement is approximately 8 hours. With the approach of old age the sleep requirement again increases.

## INSOMNIA

The inability to sleep is not a disease itself and is rarely due to disease. Its beginning is usually traceable to nervousness, worry, or pain. Caffeine interferes with the sleep of some people but has no appreciable effect upon others. Moderate fatigue induces sleep but excessive fatigue results in restlessness and insomnia.

Most people who have difficulty in sleeping become obsessed with the fear that they will be unable to sleep. This leads to emotional disturbances which make sleep and rest still more difficult.

For the prevention of insomnia physical exercise sufficient to produce moderate fatigue is usually helpful. A leisurely walk in the fresh air may be all that is necessary. A warm bath, not a hot one, and a glass of warm milk at bedtime aid in relaxation and hence are useful to induce sleep. The various milk drinks which advertisers claim are aids to sleep probably have no more value than milk alone, but people like to be fooled.

Until recently sleep-producing drugs were little used except to control pain, but their consumption in this country has been increasing at an enormous rate. For this purpose the barbiturates, sold under fancy names and at fancy prices, are most widely employed. Used occasionally and upon the advice of a physician these are distinctly useful drugs. They bring welcome sleep to many distraught persons. But the regularity with which they are taken and the reliance placed upon them by an increasing number of persons are cause for concern. Stimulation throughout the day with tobacco, coffee, and alcohol, and sleep at night with the aid of drugs can lead only to disaster.

Furthermore, some of the widely used sedatives contain a drug, called "amidopyrin" or "pyramidon," which destroys the white blood corpuscles of certain people. As a result of this, resistance to infection is so lowered that a common cold may result in sudden death. During a recent 3-year period, 1,300 deaths in the United States were attributed to the use of pain-relieving or sedative medicinal preparations containing these drugs. Only a small proportion of people are thus affected by it, but there is no way of knowing to whom it will be toxic; hence, the only safe course to follow is to avoid all medications which contain it. This obviously can be done only by refusing to use medicinal preparations with trade names unless the ingredients are known.

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## *Chapter* IX

# SPECIFIC DISEASE PREVENTION

We frequently speak of increasing individual resistance to disease by exercise, fresh air, good food, and rest. All of these measures are important for the maintenance of health but they do not afford protection against communicable diseases. An athlete in the best of health is just as susceptible to measles, smallpox, or scarlet fever as is his friend who leads a sedentary life.

Resistance to communicable diseases depends upon the possession by the body of specific protective substances, the so-called "antibodies," which destroy infections or counteract their poisonous products. The body may possess these protective substances either by manufacturing them itself or by obtaining them from some other person or some animal which has produced them.

The human or animal body produces antibodies when stimulated to do so by the presence of a disease-producing germ or its poisonous products. Practically, this may occur as a result of having a disease or of introducing into the body some of the dead or greatly weakened germs of the disease or minute amounts of their poisonous products; the latter method is called "vaccination." The immunity or resistance thus developed is spoken of as an "active immunity" because the body produces its own protective substances. Such immunity is relatively slow

in developing but tends to last a considerable period of time. In some instances this may be a few months, in others a few years, in still others a lifetime.

The other type of specific resistance or immunity is obtained by injecting into the body some of these protective substances which have been produced by a person who has had the disease or by an animal into which the germs or their poisonous products have been injected. In either instance the protective substances are found in the blood. If taken from some other person, the liquid part of the blood, with or without the corpuscles, is injected directly. If from animals, the protective substances are removed from the blood, concentrated, and standardized before injection. The resistance or immunity thus obtained is present immediately after the injection but lasts a relatively short time, at most a few months. The degree of protection or resistance depends upon the quantity of protective substances injected. This so-called "passive immunity" is given when there is need for immediate protection, as when one is actually ill with a disease or when infants, who are particularly susceptible, have been exposed to a disease against which such protective substances are available.

## Misconceptions Concerning Immunizations

Much misinformation and misunderstanding prevail concerning artificial immunizations. Practically everyone has heard that there are vaccinations or inoculations against certain diseases, but whether these are safe and of established value is not generally known. Furthermore, there is, in addition to honest doubt and questioning, a certain amount of definite, organized propaganda against immunization procedures.

Some of the enemies of immunization are merely misinformed, misguided cranks. Others use it as an argument for securing adherents to some particular form of treatment of disease prevention. Even some of the latter in their ignorance are perfectly sincere in their opposition, but it is difficult to believe in the sincerity of practitioners of some of the so-called "healing cults"

who during an epidemic of smallpox seek vaccination for themselves while advising their patients to avoid it.

The question most frequently raised concerning artificial immunization is whether it may not be deleterious to inject these dead or weakened germs or their products into the body; particularly is this true when several vaccinations are suggested. This is a natural and perfectly proper question, but the answer is obvious when one considers that when recovery from these diseases occurs it is practically always complete even though enormous quantities of the infection have permeated the body. In vaccinations the quantities introduced into the body are definitely known and are far below the amounts which will cause damage. Such injections do not produce so great or so prolonged an immunity as usually follows an attack of the disease but neither do they carry the hazard of prolonged illness, serious complications, and even death itself that accompanies natural infection.

It is difficult for physicians, and impossible for the public, to keep accurately informed concerning the value of all of the immunizations which are proposed. Manufacturers in this field are constantly offering and advocating new preparations. Some of these are of merit, but for others there is no excuse whatsoever. Among the vaccinations of greatest practical value in this country are the following:

## Smallpox Vaccination

A person living today cannot possibly realize what smallpox meant before the days of vaccination. Smallpox was just as inevitable then as measles is today. In fact, it was considered a children's disease, just as chicken pox, whooping cough, and measles are considered children's diseases today, for hardly anyone ever reached adult life without having had it. It has been estimated that 60 million people in Europe died of smallpox during the eighteenth century. A French physician in 1754 wrote that "every tenth death was due to smallpox and one-fourth of mankind was either killed by it or crippled or disfigured for life."

Smallpox was introduced into Mexico by the Spaniards very

soon after the discovery of America. Within a short period 3½ million persons were said to have died of the disease in Mexico alone. Rapidly the disease spread to the American Indians, and it has been estimated that half of them died of it in a short time.

Smallpox is a disease which varies enormously in severity. In prevaccination days it was always severe, being fatal to between 20 and 30 per cent of its victims. But just prior to the beginning of the twentieth century a very mild form of smallpox appeared in Florida and spread very rapidly over the whole of the United States. Since then this mild, nonfatal type of the disease has predominated to such an extent that people have become careless about maintaining immunity to it. This is unfortunate, for whenever a sufficient proportion of the population becomes susceptible an epidemic of smallpox is possible. Whether this is mild or severe depends upon which type of infection happens to be introduced.

In the winter of 1924–1925 such a calamity occurred. People had become negligent about vaccination and when the malignant type of smallpox was brought into this country several serious epidemics occurred. In Minneapolis alone during December and January of that winter there were approximately 1,000 cases of smallpox with 300 deaths. During the winter 17 cities of 100,000 population or more reported deaths from smallpox and some of these, notably Detroit, Toledo, and Camden, had unusually high rates.

As a result of these outbreaks people became alarmed and rushed to be vaccinated. Evidence of repeated carelessness in this regard was reappearing; by 1936 there were 7,813 cases of smallpox reported in the United States, more than in any country of the civilized world except India. In 1948, however, a new low record was established when only 124 cases of smallpox were reported in the entire United States.

The occurrence of smallpox is in no way influenced by climate, soil, age, or occupation. It affects alike the rich and the poor, the clean and the dirty. It spreads wherever the contagion finds susceptible people. The one and only method of controlling it is to raise individual resistance by means of vaccination.

Vaccination as we know it today was developed by Edward Jenner in England in 1796. Prior to this many persons were immunized by the *inoculation* of material which was taken from a smallpox sore and rubbed into a slight abrasion of the skin. This practice had been in vogue for centuries in India and China. Mild cases of smallpox actually developed in persons thus inoculated. It is said that an English physician was granted a life annuity of £10,000 per year for performing this service for Catherine the Great of Russia.

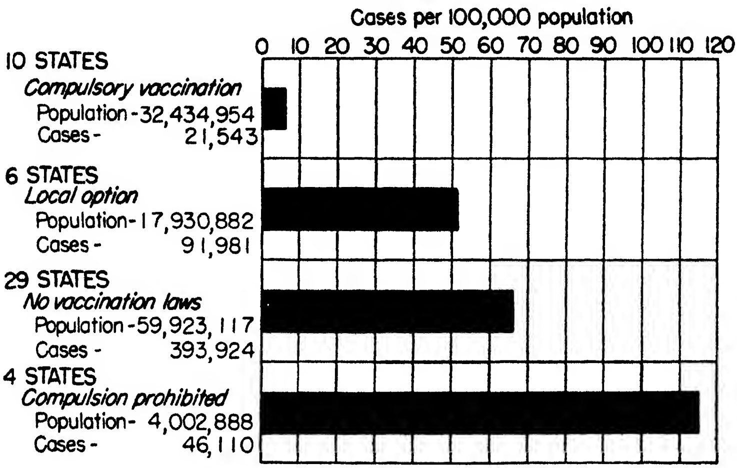



FIG. 4. SMALLPOX IN THE UNITED STATES, 1919–1928.

Vaccination, although still confused in the minds of some with inoculation, is an entirely different procedure. The vaccine material is obtained not from patients with smallpox but from healthy calves which have been inoculated with cowpox or from laboratory cultures on chick embryo culture medium. In the preparation of this vaccine the most careful surgical technique is used, after which the vaccine is tested for purity and then accurately standardized.

There is no longer any possible question concerning the efficacy of vaccination for the prevention of smallpox. In many countries of the world and in certain states of this country vaccination against smallpox is compulsory. In such countries and

states smallpox is practically unknown. But where vaccination depends upon individual initiative, smallpox finds a fertile field.

The greatest mass vaccination campaign ever undertaken was conducted in New York City in the winter of 1947. In less than one month more than 6,500,000 persons were vaccinated, over 5,000,000 of these within two weeks after the mayor of the city appealed for universal vaccination. The reason for this appeal was the occurrence of several cases of very severe malignant smallpox. This campaign limited the outbreak to 12 cases and 2 deaths. This is a remarkable accomplishment, particularly as compared to what happened in 1901 when the city had less than half its present population and 1,859 cases and 410 deaths occurred before a similar epidemic was brought under control.

Complications of vaccination are occasionally reported, but they occur very, very rarely; possibly once in 100,000 vaccinations. Certainly the risk is infinitesimal in comparison with the protection conferred by vaccination. The dangers of vaccination claimed by the antivaccinationists are practically all fallacious or of such antiquity that they do not apply to modern vaccination.

The duration of the immunity as a result of vaccination is variable. For five to seven years the protection is of a high grade, after which the immunity gradually decreases until it is completely lost five to ten years later. The first vaccination should be performed before a child reaches his first birthday. This gives a high-grade immunity, which should never be allowed to disappear completely. The second vaccination may well be done at the time of beginning school and subsequent vaccinations at intervals of five to ten years. By following this program, resistance will be kept at such a level that subsequent vaccinations will cause no inconvenience and yet immunity to smallpox will be maintained. It is disgraceful today for any intelligent person to contract smallpox.

## Diphtheria Immunization

In 1945 approximately 1,600 persons died from diphtheria in the United States, most of whom were children. Yet if reasonable use were made of available scientific knowledge, this disease

would soon become as rare as cholera and yellow fever. We have a test which determines who is susceptible; we have an immunizing agent which gives prolonged immunity; we have an effective antitoxin for treatment of the susceptible persons who develop the disease. Nothing more could be desired. But it remains for the public to utilize this service which physicians are prepared to render.

Diphtheria is caused by a bacillus which sets up an infection in the throat and gives off a toxin (poison) which is absorbed into the blood stream and carried throughout the body. This affects primarily the nervous system, causing paralysis, and the heart muscle, causing heart failure. If one is to recover from diphtheria, this toxin must be neutralized by antitoxin which the body produces or which is injected for treatment.

Diphtheria germs are disseminated in the nose and discharges of patients and carriers and are spread to others by droplets of moisture in the air or by hands, drinking glasses, and other objects which can retain and transmit infection. Fortunately, these germs have a distinctive appearance under the microscope so that it is possible by means of nose and throat cultures to identify individuals who have these germs in the nose or throat.

The most important of the measures for the prevention of diphtheria is the active immunization (vaccination) of children. This is accomplished by the injection of a minute but definite amount of modified diphtheria toxin (poison). This material is now available for immunization in several forms: toxoid, alum-precipitated toxoid, and toxin-antitoxin. Toxoid and toxin-antitoxin have been used in millions of cases and found effective and entirely harmless. Alum-precipitated toxoid is relatively new but requires only one dose and seems to be almost as effective as the other preparations which require two or three doses. Most deaths from diphtheria occur among children under five years of age; hence, at the age of six months every healthy child should be immunized against diphtheria. At this age the need for protection is most urgent and the procedure is perfectly safe.

The Schick test, which is a dependable test of immunity

against diphtheria, consists of the injection into the skin of the forearm of a very small but definitely measured amount of diphtheria toxin. If redness results, it is called a positive test and indicates that the individual is susceptible to diphtheria. No redness in two days indicates immunity. With infants and young children this test is rarely used, because so many of them are susceptible that it is better to immunize them all than to attempt

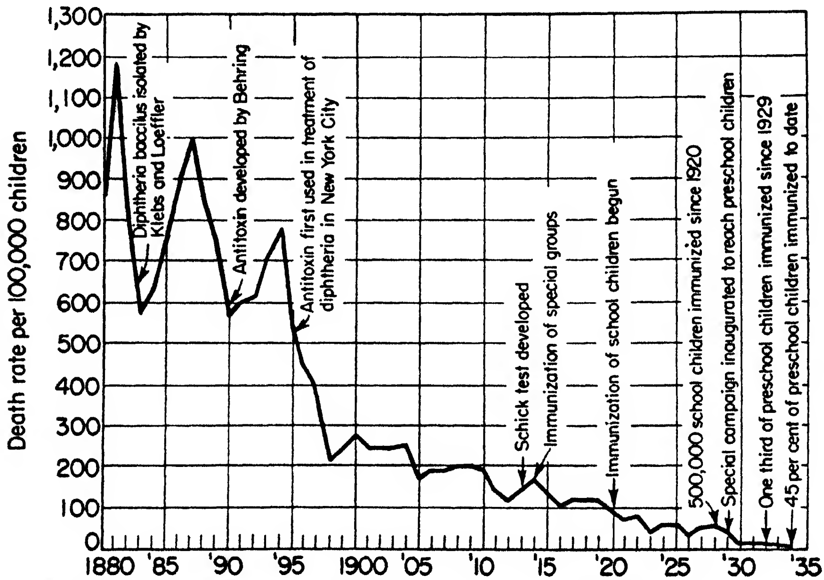



FIG. 5. TREND IN DIPHTHERIA DEATHS IN NEW YORK CITY. Crude annual death rates for diphtheria per 100,000 children under ten years of age, 1880–1934. (*From Dublin, L. I., and A. J. Lotka, "Twenty-five Years of Health Progress," p. 57, Metropolitan Life Insurance Company, New York,* 1937.)

to pick out the few who might be naturally immune. Among older children and adults, however, the proportion of immunes is greater. Hence, this test gives information of distinct value.

Diphtheria antitoxin, which is prepared from the blood serum of a horse treated with diphtheria toxin, contains protective substances which neutralize the diphtheria toxin, and so is useful for treatment or temporary protection. Before the use of antitoxin, which was developed about the beginning of the present century, approximately one person out of every three who

got diphtheria died. With antitoxin available there would be practically no deaths if the antitoxin were administered at the very onset of the disease and in sufficient dosage.

With toxoid to give prolonged protection there should be less need of antitoxin for treatment; but as long as immunization depends upon individual initiative, we shall need antitoxin to try to save those who are the unfortunate victims of their own or their parents' negligence. Even antitoxin will not save them all. Some will come too late or will not come at all and so will be additional sacrifices upon the alter of ignorance, prejudice, and procrastination.

## Scarlet Fever Prevention

Scarlet fever is another disease for which we have a skin test for immunity, an immunizing agent to give prolonged protection, and a serum containing protective substances (antitoxin) for treatment. The materials used for these purposes act in the same manner as in diphtheria but are somewhat less effective.

The cause of scarlet fever is a streptococcus, very similar to the ones which cause tonsillitis, septic sore throat, and erysipelas. These germs enter the body through the nose or mouth and set up an infection on the tonsils and in the pharynx. This stage of scarlet fever is indistinguishable from tonsillitis. However, as the scarlet fever germs grow in the throat, they give off a toxin which is absorbed into the blood stream and carried throughout the body. This toxin is responsible for the characteristic red rash from which scarlet fever gets its name and for the nephritis which may occur during scarlet fever. The complications of sinus, ear, and mastoid infections are due to the extension of infection from the pharynx to these regions.

In mild cases of scarlet fever, sometimes called "scarlatina," the rash may be so slight as to be hardly noticeable. Although many of these patients are hardly sick at all, they should be isolated just like other cases because they serve as sources of infection, and persons who get the disease from them may have severe attacks.

The scarlet fever germs are contained in the nose, throat, and

ear discharges of patients, mild cases which are frequently unrecognized, and carriers. The old idea that the skin which peels off during convalescence is the source of infection is erroneous, except in so far as this skin has been contaminated by discharge from the nose, throat, or ears. Transmission of the infection from person to person is by contact with patients or carriers, or by means of droplets of moisture expelled from their noses or mouths, or through milk or inanimate objects, such as drinking glasses, towels, and doorknobs, which harbor the germs.

The Dick test is used to determine whether one is immune or susceptible to scarlet fever. Persons who develop a slight redness of the skin at the site of the test are susceptible, and those who show no redness are probably immune. It is of practical value to have this information in regard to children and to physicians, nurses, and others who are likely to be exposed to scarlet fever.

The material used as a vaccine to stimulate the development of a prolonged immunity consists of scarlet fever toxin. A series of five injections is used, the amount contained in the first injection being smallest, with subsequent injections somewhat larger. Occasionally reactions with fever, gastrointestinal upset, or slight rash follow these injections but these reactions are infrequent and of short duration. The safety of this procedure is shown by the fact that no demonstrable harm has resulted from hundreds of thousands of injections. Its efficacy has been demonstrated beyond any reasonable doubt among physicians and nurses who are constantly exposed to scarlet fever.

The reason that relatively little is known of scarlet fever immunization is that physicians and public health officials have not urged it as they have urged immunization against smallpox and diphtheria. For this there are several reasons. One is that, although scarlet fever is much more prevalent than diphtheria, it has been relatively mild in recent years. A second is that it is always difficult to secure the widespread acceptance of an immunization procedure which requires as many as five visits to a physician. A third is that the unpleasant, although not serious, reactions which occasionally follow the injections give rise to

some opposition. These are practical considerations which have caused public health workers to hesitate to promote immunization against scarlet fever. Furthermore the effectiveness of penicillin and the sulfonamides in the treatment of scarlet fever reduces the need for immunization.

## Antityphoid Vaccination

In civil life typhoid fever has been almost wiped out by the sanitation of water, milk, and food supplies. In the Army and Navy, however, sanitary measures have been supplemented by the use of typhoid vaccine. This vaccine consists of dead typhoid germs, a definite number of which are introduced into the body in order to stimulate the development of resistance to the disease.

The efficacy of typhoid vaccination in increasing resistance to this disease is beyond question. But the hazard of typhoid fever has been so greatly reduced that few people in civil life consider it necessary to keep up individual resistance by means of vaccination. This is a reasonable course to follow when the sanitary status of one's water, food, and milk supply is known. On the other hand, when one is traveling, particularly in foreign countries, typhoid vaccination is cheap insurance against a very serious disease.

## Whooping Cough Vaccine

The vaccination of infants against whooping cough has been considered in the preceding chapter of this book. This vaccine does not give complete protection in every case, but it does raise the resistance of children to one of the most serious and distressing diseases to which they are subject. Whooping cough is most serious during infancy, so this protection should be provided during the first year of life. An alum-precipitated mixture of whooping cough vaccine and diphtheria toxoid for immunization against both diseases in infancy has recently become available and is giving good results. Hyperimmune serum gives considerable protection for a short time to children who have already

been exposed to the disease. It seems also to modify the severity of the attack in many cases.

## Protection against Measles

Measles is such a serious disease in infants that the injection of blood, gamma globulin, or placental extract, described in a preceding chapter, is advisable whenever young children have been exposed to this disease.

## Tetanus Antitoxin and Toxoid

Tetanus is the scientific name for the disease commonly called "lockjaw." The widespread belief that tetanus is most likely to develop in wounds contracted by stepping on a rusty nail in the garden has a scientific basis. The normal habitat of tetanus germs is the intestinal tract of horses and other herbivorous animals. Hence, these germs are likely to occur wherever there are excreta from these animals. Barnyards, highways, fields, and gardens in which manure is used as a fertilizer are practically certain to abound with highly resistant forms of this organism.

Protection against tetanus may be obtained by the injection of tetanus antitoxin, which contains substances that neutralize the tetanus poison. Such protection is of short duration; hence, the antitoxin is administered only after injuries which are likely to have been contaminated with tetanus germs.

The value of tetanus antitoxin used in this manner is clearly demonstrated by the experiences during the First World War. This war was fought over a country which had been richly fertilized for hundreds of years; high explosive shells produced just the type of deep, tearing wounds in which the tetanus germ has the best chance to grow; and the uniforms of the soldiers who served in the trenches were usually literally plastered with mud and dirt containing tetanus germs. Hence, conditions were unusually favorable for the development of tetanus.

In October, 1914, when no antitoxin was used, 32 cases out of every thousand of British wounded developed tetanus. By the universal use of antitoxin this was reduced to 2 cases per thousand. The United States profited by the experience of its

allies and administered antitoxin routinely to every wounded soldier, with the result that there were only 36 cases of tetanus among 176,132 American wounded—a rate of 0.2 per thousand.

A tetanus toxoid to give prolonged immunity against the disease was developed a few years ago. After being shown to be both effective and harmless, this was administered to all persons in the United States Army and Navy during the Second World War. The result was that only 4 cases of tetanus developed among more than 10,000,000 men in our armed forces, and only 2 of these were the result of battle casualties.

It is now recommended that tetanus toxoid be given to all children in infancy. This will provide prolonged protection but "booster doses" should be given whenever an injury occurs that might be contaminated with tetanus germs.

## Infantile Paralysis

Poliomyelitis, or "infantile paralysis," as it is commonly called, is an acute communicable disease which is characterized by symptoms of a generalized infection and by the destruction of groups of motor cells in the central nervous system, with resultant paralysis. It is caused by a living virus which, at least in certain stages of its development, is small enough to pass through the pores of a porcelain filter. This germ enters the body through the nose or mouth and is disseminated in the nose, throat, and intestinal discharges of patients, mild unrecognized cases, and carriers.

The hazard of death or crippling from this disease is small in comparison to the hazard from accidents, tuberculosis, syphilis, etc., but its effects are at times so tragic that parents tend to become panicky whenever infantile paralysis is reported in the community.

The majority of cases occur in children under five years of age and during the months of July, August, and September. Transmission is by close contact with patients or carriers or through articles recently contaminated by them. Drying does not kill the virus and it has been demonstrated in the dust of the sickroom.

Studies of the blood serum of the adult population in different parts of the country show that 50 to 80 per cent contains antibodies against the virus of poliomyelitis. This would indicate that most persons at some time or other have been infected with this virus and that paralysis is the exception rather than the rule.

The most important single point in a program for the prevention of poliomyelitis is the early diagnosis of the cases and the recognition of the disease in the many mild cases in which paralysis does not develop. Unfortunately there are no early symptoms or signs which are diagnostic of this disease. Most patients have a sore throat, fever, headache, and constipation or diarrhea with or without vomiting. Irritableness, drowsiness, and a desire to be let alone are common. These symptoms are rather typical but they occur also in other diseases and may be absent in definite cases of poliomyelitis.

During every epidemic of poliomyelitis many children develop paralyses and horrible deformities because of improper treatment or no treatment during the febrile and postfebrile stages of the disease.

Blood serum from patients who have recently recovered from the disease or from adults whose blood contains antibodies against the virus of poliomyelitis has been widely used for early treatment in the hope of preventing paralysis. Some years ago much was anticipated from this treatment but critical analyses of the results obtained have been disappointing.

Several vaccines have been suggested for the prevention of this disease and have been tried on a rather large scale. Unfortunately, these results also have been discouraging.

## Other Immunizations

Numerous other vaccines and serums are produced. Cold vaccines and BCG vaccine against tuberculosis have been considered. Acne vaccines are of value in about one-third of the cases. Certain carefully selected cases of pneumonia are benefited by the injection of a serum containing substances which destroy the particular pneumonia germ involved.

Certain other serums and vaccines, such as those against ty-

phus fever, yellow fever, cholera,[1] Rocky Mountain spotted fever, anthrax, and botulism, are of definite scientific value but are of little practical use in this country because of the infrequency of the diseases against which they give protection. Others which are prepared commercially and are offered for sale are not of sufficiently established value to justify their use.

Artificial immunization has been one of the most valuable preventive measures contributed by science. We can now be protected by vaccination or serum injections against many dread diseases and we are hopeful that the future may provide us with effective vaccines against such other diseases as influenza, tuberculosis, pneumonia, the common cold, and infantile paralysis. On the other hand, as Dr. William H. Welch said, the application of scientific discoveries is discouragingly slow:

> When a Koch discovers the tubercle bacillus, a Banting discovers insulin for the relief of diabetes, or a Von Behring an antitoxin for the cure of diphtheria, or a Park demonstrates the value of the toxin-antitoxin for the prevention of diphtheria, the world draws a long breath as if saying to itself, "Now we are rid of that terror which has haunted the human race for centuries." It then straightway forgets and goes on its way comfortably assuming that of course the great discovery, or invention, is being carried into effect.
>
> The actual facts are quite different. A few people, those of unusual initiative, or ample means, or who happen to be under the care of exceptionally alert physicians, or within the jurisdiction of exceptionally competent health officers, receive the benefits of the new discoveries; but the great mass of the human race goes on as before, and the death rate from these diseases is reduced slowly and over long periods of time.
>
> In fact, the health field has a woefully ineffective distribution service, as compared with the laboratories of the world. We know how to do a lot of things which we do not do, or do on a wretchedly small scale. Few of the great discoveries of preventive medicine, except the prevention of yellow fever, are anywhere nearly fully applied.

## READING SUGGESTIONS

1. Anderson, Gaylord, and Margaret Arnstein: "Communicable Disease Control," The Macmillan Company, New York, 2d ed., 1947.
2. Bauer, W. W.: "Communicable Diseases, What They Are and How to Deal with Them," Alfred A. Knopf, Inc., New York, 1934.

[1] American soldiers who were to be sent to certain areas were vaccinated against typhus, yellow fever, and cholera.

3. DeKruif, Paul: "Microbe Hunters," Harcourt, Brace and Company, Inc., New York, 1926.
4. Thomas, Ruth A.: "The Why and How of Immunization," *Hygeia*, vol. 25, p. 626, August, 1947.

## Text-Films

The following McGraw-Hill Text-Film on Health Education is recommended for use with this chapter of the text, as well as with Chapter II.

The Body Fights Bacteria (17min sd motion picture). The film describes the counterbalances to human disease: (1) the body's own defenses, (2) artificial immunization, (3) drugs. Animated drawings, live photography, and action photomicrography are employed in the discussion.

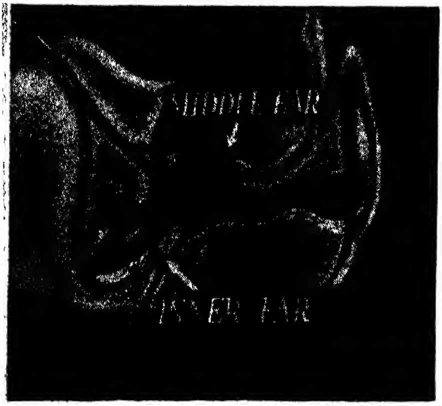
Silent follow-up filmstrip based on material contained in the motion picture offers opportunity for review, testing, and further discussion.

*Chapter* X

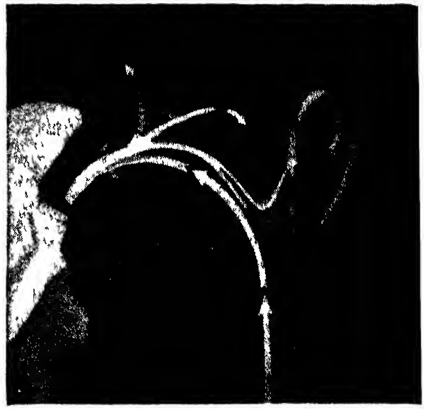
# CARE OF THE NOSE, THROAT, EARS, AND TEETH

Most of the acute infections to which man is heir enter the body through the nose and mouth. Common colds, influenza, tonsillitis, pneumonia, scarlet fever, diphtheria, infantile paralysis, and so on, through a long list of diseases, find their way into the body through this portal. Measures which reduce the infective material which gains access to the nose and mouth, such as frequent washing of the hands and keeping them away from the face, the use of individual drinking glasses, and the avoidance of exposure to persons with these diseases, are all worth while. There is, however, little or nothing of value in the way of local preventive measures to suggest. In fact, the best advice that can be given to most persons concerning the care of the nose and throat is briefly expressed by: "Whatever you do do, don't."

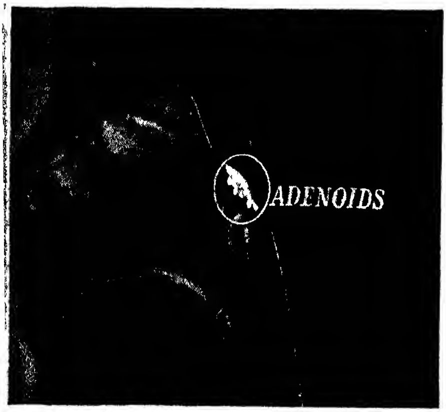
The alleged value of gargles, nasal douches, jellies, sprays, or drops, the so-called "control by nasal hygiene," is based on nothing more than advertising propaganda. Furthermore, the regular use of such preparations without medical advice is pernicious. These preparations usually give temporary relief of nasal stuffiness but they also interfere with the normal protective mechanism of the nasal mucous membrane and in time may cause sufficient irritation to give rise to a chronic catarrhal condition. When this occurs, the medication still gives temporary relief, so the natural inclination is to use it more frequently.



The delicate, complex mechanism of the human ear.

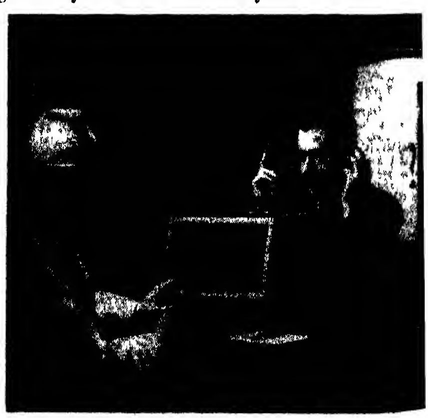


The health of nose, throat, and ears are closely related




Adenoids and tonsils are thought to be protective organs. They should be removed only when infected.

Self-prescribed remedies are *not* recommended.



The audiometer detects the slightest degree of hearing loss.

(*From The Nose, Throat, and Ears, a McGraw-Hill Text-Film*)

There is a possibility also that over a period of time there may be enough absorption of these substances to be deleterious. Sniffers of cocaine or of snuff soon learn that absorption from the mucous membrane of the nose is prompt and efficient. In like manner, other substances are absorbed and in some cases the effects might well be cumulative and toxic.

## Obstruction to Breathing

The most frequent cause of obstruction to breathing is the common cold, a condition of such importance that we have devoted several pages to its consideration. Uncomplicated colds rarely last more than a week or two, but the sinus infections which may complicate them are frequently protracted. The other common causes of chronic nasal obstruction are adeonids in children and allergic conditions, nasal polyps, and abnormalities of the nasal septum in older persons. Lasting relief can be expected only by eliminating the cause of the obstruction, whatever this may be. Self-medication merely aggravates the trouble.

*Adenoids.* The dull, pinched, stupid expression of the mouth-breathing child cries for relief. Susceptibility to colds and ear infections, impaired hearing, and a deformed upper jaw are among the other results of chronic mouth-breathing by children. The usual cause of this is adenoids, an overgrowth of tonsillike tissue located in the upper part of the pharynx behind the nose. Fortunately this can be relieved by a simple surgical procedure.

*Abnormalities of the Nasal Septum.* The septum is the partition between the two sides of the nose. It is composed in part of cartilage and in part of bone. Theoretically the septum should be straight but it rarely is. In fact, a perfectly straight septum is just as rare as an artistically perfect nose. Although most deformities of the septum are of little or no consequence, they occasionally are of sufficient seriousness to interfere with breathing. This not only is annoying but also predisposes to colds and sinus infection. In such cases an operative procedure to straighten the septum is indicated.

*Sinus Infection.* The term "sinus infection" is now used almost as loosely as nasal catarrh was in the past; many persons

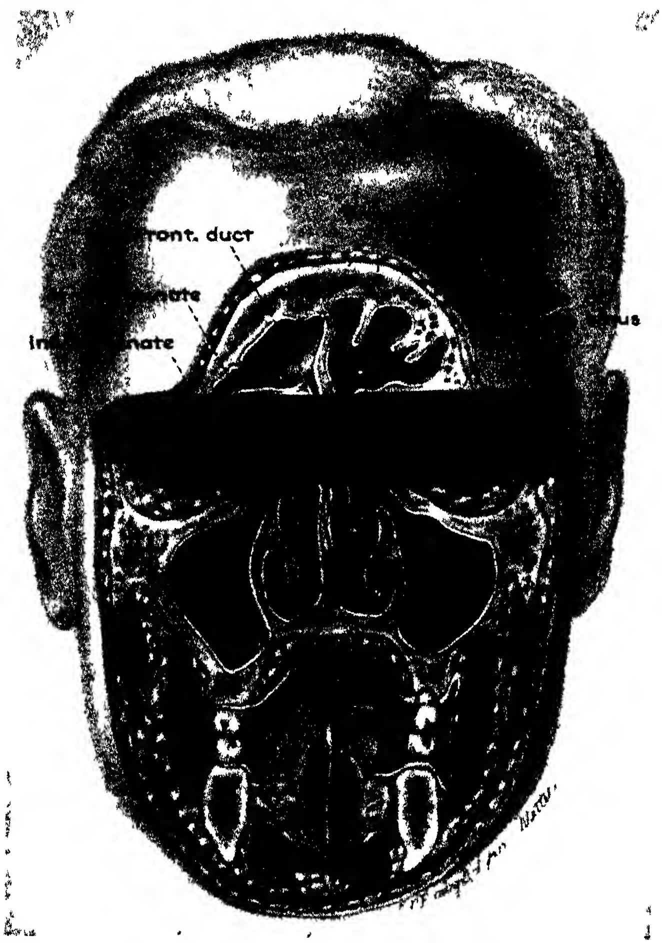


FIG 6 CORONAL SECTION OF HEAD (SEMISCHEMATIC) TO SHOW RELATIONS AND COMMUNICATIONS OF PARANASAL SINUSES The nasofrontal duct and the ostium of the maxillary sinus connect the frontal sinuses and the maxillary sinuses respectively with the nasal cavity (*From L. R Boies, "Fundamentals of Otolaryngology," W. B. Saunders Company, Philadelphia,* 1949.)

who because of some nasal stuffiness think they have sinus infection do not have it at all. On the other hand, sinus infection is of such frequency and seriousness that it merits careful diagnosis and treatment.

The sinuses are cavities in the bones of the face which are con-

nected by small openings with the nasal cavity and are lined with mucous membrane which is continuous with the mucous membrane of the nose. It is probable that when an acute cold has existed for several days without much improvement, the inflammation has extended to the membranes lining the sinuses, especially to the lower sinuses, which do not drain so easily as the upper group. In the majority of instances, even though some inflammation has extended to the sinuses, the condition will heal promptly as the individual's resistance increases and the natural forces of repair improve under the general measures advisable in these conditions.

The actual cause of sinus disease is infection from the nose, but predisposing factors are violent blowing of the nose, a hypersensitive allergic nasal mucous membrane, diving, swimming with the nose in the water, possibly damp climates, and the promiscuous use of sprays, oils, and antiseptics in the nose during acute colds.

Acute sinus infections often clear up without treatment or with the application of such simple measures as heat, steam inhalations, rest, and improved nasal drainage. Occasionally, however, the infection is so severe or drainage so inadequate that pus accumulates in the sinus. This, also, may clear up promptly or it may develop into a subacute or chronic condition. In acute sinus infection local symptoms of nasal discharge, pain, and headache, as well as general symptoms of fever, fatigue, general aching, and cough, are the rule. In chronic sinus disease, on the other hand, the local symptoms may be entirely absent. Occasionally infection from a sinus may be carried by the blood to other parts of the body, such as the joints, kidneys, heart, or brain. A condition potentially so serious calls for adequate medical supervision and treatment.

## Hay Fever

The sneezing, sniffling, and nose blowing, commonly called "hay fever," occur with greater or lesser frequency the year round. In fact, hay fever and related allergic conditions, such as asthma, hives, and certain eczemas, headaches, and digestive

disturbances, occur whenever the substance to which an individual is sensitive gains access to the body in sufficient quantities.

The symptoms considered typical of hay fever may be produced by pollens of plants, grasses, or trees, by the dander or hair of animals, by lint, feathers, foods, and many other substances. The pollens, however, are the only substances of this sort which are definitely seasonal. Most cases of spring hay fever are due to grass pollens, although even before the grasses begin to pollinate there are some cases, usually considered spring colds, which are due to the pollens of trees. The pollens of most of the flowering plants are relatively large and heavy and are carried from one plant to another by bees or other insects; hence, they are rarely responsible for hay fever. On the other hand, the pollens of grasses, trees, and many other plants are wind-borne and spell misery to hundreds of thousands of persons each year. Such pollen grains may be carried enormous distances and to great heights by air currents.

The most common causes of spring hay fever, frequently called "spring colds" or "rose colds," are the pollens of trees and grasses, while the pollens of ragweed, wormwood, Russian thistle, and pigweed are responsible for most of the fall hay fever. Goldenrod, long thought to be the cause of fall hay fever, has been exonerated. It and other flowering plants have been suspected in connection with hay fever because they happen to flower at the time that weeds with inconspicuous flowers are pollinating.

After a physician has determined the cause of one's hay fever, the simplest way to prevent it is to live, at least during the hay fever season, in a region in which the pollens to which one is sensitive do not exist. Another way to reduce exposure to pollen is to spend most of the day during the hay fever season in filtered air. This gives relief in many cases.

For the unfortunate hay fever victims who cannot move away during the hay fever season and whose homes and places of work are not air-conditioned, there is still considerable hope of obtaining relief, for it is usually possible so to increase one's tolerance that one will be free from symptoms or at least reasonably com-

fortable even though exposed to high concentrations of pollen. This is accomplished by having a series of injections of the pollens to which one is sensitive. In order to be effective this treatment must be based upon an accurate diagnosis of the causes of the hay fever and the inclusion in the treatment material of all the pollens which are responsible for symptoms. Failure to do these two things has been the reason for many of the unsatisfactory results from this type of preventive treatment of hay fever in the past.

Temporary relief in hay fever and other allergic conditions can frequently be obtained by the use of a relatively new group of drugs called antihistamines.

## The Tonsils

With so many tonsils being removed one naturally wonders what the tonsils are for. Actually there is no certain evidence as to their purpose, although it is generally thought that they have some sort of protective function, ineffective though this seems to be in most cases.

In childhood, tonsils and adenoids are naturally large but both decrease in size during later life. There are three conditions which make removal of the tonsils and adenoids advisable: (1) repeated attacks of acute tonsillitis or quinsy; (2) enlargement of tonsils and adenoids to the point of causing obstruction to the nose or the eustachian tube; (3) reasonable suspicion that the tonsils are serving as a focus of infection. In the event of a serious disease condition in which other possible foci of infection have been eliminated, it is sometimes advisable to sacrifice the tonsils even though the local condition does not offer adequate proof of tonsil infection.

Miraculous results cannot be expected from removal of the tonsils; but when definite indications for tonsillectomy exist, sufficient improvement may be expected to amply justify the operation. Tonsillectomy is not a dangerous procedure if adequate precautions are taken to safeguard against accident. Undoubtedly many tonsils have been needlessly removed in the past and more will be sacrificed in the future. On the other hand,

the indications for the removal of tonsils and adenoids are being more accurately defined and medical opinion on the subject of tonsillectomy is becoming more and more conservative.

## The Conservation of Hearing

Helen Keller, deaf, dumb, and blind, is credited with saying that she would value above all other senses the sense of hearing, that instrument of intercourse with others without which the sound of the human voice is lost and one becomes engulfed in an indescribable loneliness. Living in lonely silence day after day, year after year, it is small wonder that the deaf become depressed, seclusive, irritable, and dependent.

It has been estimated that there are in the United States at least 3 million people with sufficient impairment of hearing to merit attention. Many of these even with progressive deafness are unaware of the condition. In fact, impairment of hearing is frequently unrecognized and not even given serious consideration until 75 per cent of the hearing has been lost.

## Causes of Deafness

Certain types of deafness are determined before birth. Some of these appear in early life, others with advancing years. Most deafness, however, is due to inflammatory conditions of the middle ear, to interference with normal nasal breathing, to foci of infection in sinuses, tonsils, teeth, gall bladder, or other organs of the body, to the toxins of scarlet fever, diphtheria, or syphilis, to accumulations of wax in the external ear canal, or to certain nutritional, glandular, or general diseases.

Inflammatory conditions of the middle ear are produced by infections which reach the middle ear from the throat by way of the eustachian tube. In children the eustachian tube is straighter and larger than in adults; hence, infection can traverse its course most easily in childhood. An acute infection of the middle ear, even though the eardrum is ruptured or opened, usually produces little or no impairment of hearing, but recurrent or chronic infections are almost certain to result in a greater or lesser degree of deafness.

The complications of "abscessed ears" can in a large measure be avoided if the condition is given the attention it deserves. Unfortunately in the past, earache and abscessed ears have been considered as incidental to childhood, like measles or chicken pox. Profuse discharge from an ear attracts attention, but once it has started "drying up" the ear is often forgotten and the infection smolders on until a chronic condition is reached or the infection suddenly flares up to the extent that an operation on

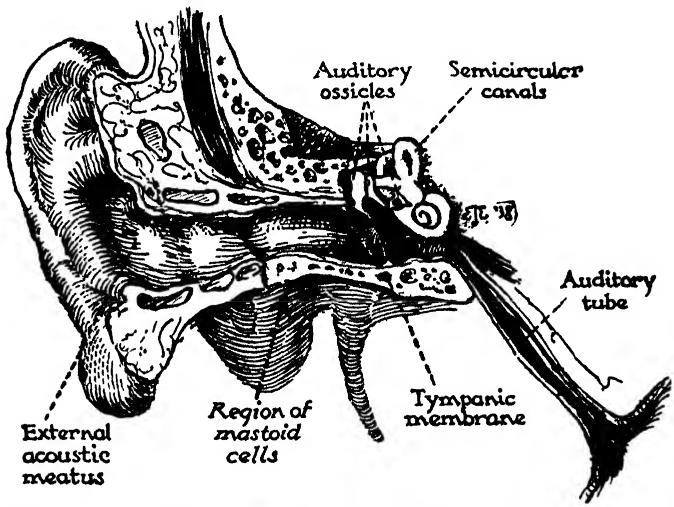



FIG. 7. SECTION OF EXTERNAL, MIDDLE, AND INTERNAL EAR (SEMISCHEMATIC). To show relationships.

the mastoid may become necessary. It is nothing short of criminal to allow an ear to discharge over a long period of time when proper treatment will clear it up. Hearing once lost can never be restored.

The prevention of ear infections depends primarily upon the prevention and treatment of nose and throat infections and general diseases, upon the removal of diseased tonsils and adenoids, and upon care in the blowing of the nose—the nose should be blown gently with both sides open. Deafness from scarlet fever and diphtheria is preventable, for we have a safe and effective immunization against each of these diseases. Syphilis, even if acquired, need never develop to the stage at which it affects

hearing. Adenoids and tonsils can be removed when indicated, obstruction to breathing relieved, foci of infection eliminated, and general health improved.

Wax, which is normally present in the external ear canal in small quantities, occasionally accumulates and hardens so that it covers the eardrum and interferes with hearing. This usually may be removed by gently syringing the ear canal with warm water. If this is not successful, a physician should be consulted. The use of hard instruments may result in injury and infection.

Swimming and diving, in the opinion of most otologists, are not dangerous to the ears in individuals with intact eardrums provided certain precautions are taken. Diving feet first so that water forcibly enters the nose, improper exhaling with the head submerged, and vigorous blowing of the nose after emerging from the water may allow water to get into the sinuses or eustachian tubes and may so irritate the nasal passages that an inflammation of the membranes lining these spaces results. Whenever one has even a semblance of a cold, one should refrain from diving and should keep the head out of water in swimming. Persons who have repeated ear infections, damaged eardrums, or mastoid operations should use special precautions to prevent water from reaching the middle ear.

## What Remains for the Deaf

Life for a deaf person is difficult at best, but if the handicap is recognized early and faced intelligently much can be done to minimize its seriousness. Proficiency in lip reading enables many deaf persons to lead a normal or a relatively normal life, but in order to attain proficiency the study of lip reading needs to be started early. Teachers of handicapped children report that it is far more difficult to teach the deaf than the blind, and that whereas the blind are usually happy the deaf tend to be despondent. To delay preparation for and adjustment to this handicap is tragic.

Improvements in electrical hearing aids are making it possible for the partially deaf to keep their contact with the world.

The type of instrument best adapted to each particular case should be advised by an otologist and its use started before the hearing is too seriously impaired. It is the height of folly to waste time and money upon commercially advertised hearing aids or methods for the relief of deafness. Earphone radios, which like the telephone transmit sound waves through the bones of the skull to the nerves of hearing, have brought many pleasant and happy hours to the deafened.

Life for the partially deaf could be made much easier if their friends when speaking to them would first attract their attention and then speak distinctly and slowly rather than loudly. Shouting is annoying, irritating, and difficult to understand.

For the one who is hard of hearing Dr. Gordon Berry lays down the following nine commandments:

1. Thou shalt frankly confess thy deafness to thyself and before thy fellowmen. Let there be no deceit nor false pride.

2. Thou shalt not covet thy neighbor's hearing but shall rejoice that thou livest in an age when thy handicap can be made so small.

3. Early and again shalt thou consult thy otologist and accept every scientific aid he can render.

4. Eschew the quack and his devices. Easy and broad is the way to his door and many there be that find it.

5. Thou shalt join and work for a League for the Hard of Hearing where thou wilt receive encouragement and stimulation for thyself and wilt find happiness in serving thy brother. Thus wilt thou march forward with the Federation army that is alleviating deafness throughout the world.

6. So love thy neighbor that thou do everything in thy power to help him when he would have speech with thee. To this end:

7. Thou shalt study lip-reading, in season and out of season.

8. Thou shalt secure and use the best ear-phone thou canst discover.

9. Triumphantly shalt thou rise above thine infirmity; and so conduct thy life that the world hath need of thee.

## Sound Teeth

The relationship of the teeth to general health and efficiency was appreciated in a general way long before vitamins or focal infections had been heard of. Toothaches used to be as inevitable as colds; and slave buyers and horse traders inspected the teeth of their prospective purchases before buying. But only in recent

times has attention been given to the care and preservation of the teeth.

## DENTAL CARIES

Early studies of the cause and prevention of dental caries suggested that there might be a single causative factor but further results show that the problem is a complex one, with diet, heredity, internal secretions, mechanical factors, and oral hygiene of greatest importance.

*Diet and Dental Caries.* There is now general agreement that diet probably is the most important single factor in the maintenance of sound, healthy teeth, and that an adequate diet is most essential during the period of most rapid growth. McCollum and Simmonds conclude from an experimental study that rats which are kept on a deficient diet during a part of the growing period have inferior teeth and early decay, even though an adequate diet is provided later. In the days before viosterol had been developed and before cod-liver oil was widely used, McCollum also reported that at the age of entering school 9 per cent of children who had been breast-fed for at least 6 months had dental caries, 22 per cent of children who were fed on cow's milk or on milk mixtures, and 27 per cent who were fed on oatmeal water and other prepared foods. This would indicate that the foundation of dental health is laid very early in life, but it now appears that the prenatal period is also of great importance in this regard. Consequently emphasis is now being placed upon a proper diet during pregnancy.

Important though diet admittedly is, there does not seem to be any single dietary factor which is responsible for dental caries. Calcium and phosphorus, the two minerals found in bones and teeth, and vitamin D, which regulates the utilization of these minerals by the body, are clearly essential. Of these, calcium and vitamin D were first thought to be of greatest importance, but the more recent work seems to indicate that phosphorus is of as great if not greater importance than calcium. Milk, certain vegetables, and fish foods are rich sources of both calcium and phosphorus. Vitamin D is very likely to be deficient in natural

foods during the winter months but is easily administered in the form of cod-liver oil, vitamin D milk, or viosterol.

Children have long been denied candy because of the belief that sugar is related to dental decay, and certain studies carried out in institutions for orphans where the diet is strictly controlled suggest that the prevalence of dental caries is directly related to the amount of carbohydrate in the diet. Cereals from which the hull of the grain has been removed seem to have an unfavorable influence upon the development of the teeth, and several investigators believe that oatmeal contributes directly to the formation of caries.

Divergent opinions concerning the relation of diet to dental health leave one rather confused. Apparently no one dietary factor is responsible for resistance to caries, but various elements are necessary for the proper development and continuing soundness of the teeth. For practical purposes a well-rounded diet, containing liberal amounts of milk, orange juice, fresh fruits, vegetables, and for children cod-liver oil or some other form of vitamin D, may be depended upon to supply the nutritional requirements of the teeth.

*Cleanliness.* It is frequently said that "a clean tooth never decays." Whether or not this is true depends upon the definition of cleanliness. If cleanliness implies freedom from bacteria, the statement probably is correct. But with bacteria constantly present in the mouth and in the food we eat, it is impossible to have the teeth bacteriologically clean.

*The mechanism of decay* is through the action of acids produced by bacterial decomposition of food, first upon the enamel and then upon the softer dentine of the tooth. The action of this acid upon the tooth structure may begin in any crevice, irregularity, or break in the enamel. The amount of decomposition and acid formation is greatest when there are gross accumulations of food substances. In fact, it is between the teeth, where it is difficult to prevent accumulations of food, that decay most frequently begins. Hence, although cleanliness of the teeth is not the only factor in the prevention of dental decay, or even the most important one it is not without significance.

Some clarification of this aspect of the problem has been given by recent studies of the bacteria found in the mouth. If a particular germ called *Lactobacillus acidophilus* occurs in quantity, caries develop with great rapidity. This is because these bacteria act upon carbohydrates, particularly sugars, on and around the teeth to form acids which dissolve the enamel and the dentine. These studies have also shown that if persons have excessive number of lactobacilli in their mouths, the amount of caries can be reduced by the elimination of sugars and other easily fermentable carbohydrates from the diet.

It now appears that certain chemicals applied to the teeth will neutralize the acids formed by the action of bacteria upon carbohydrates and therefore reduce caries. Some of these chemicals are now being included in so-called "ammoniated" toothpastes.

*Fluorine and Dental Caries.* During the past several years investigations have taken another turn. It was determined that the only chemical difference between carious and noncarious teeth is that carious teeth contain less fluorine, a chemical element which is present in minute amounts in the bones and teeth. This was followed by an investigation of the fluorine content of the drinking water in areas in which dental caries are rare and areas in which they are prevalent. Here again a difference in fluorine content was found. From these studies it has been concluded that the presence of approximately 1 part of fluorine per 1,000,000 parts of drinking water results in a decreased prevalence of caries. Incidentally fluorine in this amount causes some mottling of the teeth.

Proceeding on the basis of this information, several investigators have experimented with the application of fluorine to the surface of the teeth of children. In this study Knutson and Armstrong reported that the application of 2 per cent sodium fluoride solution to the teeth resulted in 40 per cent less caries over a period of a year in 289 children than developed in 326 untreated controls. No healing effect was noted on teeth in which caries existed. This use of fluorine for the prevention of dental caries is a promising line of investigation but it is still in the experimental stage.

Other exceedingly important studies are those in which sodium fluoride in minute amounts is being added to the water supplies of several cities which have a low fluoride content. If this should prove effective in preventing caries, it will be a great forward step in the control of this most widespread of human diseases.

That *other factors* play a part in determining the health of teeth is evident from the fact that some persons remain immune from caries no matter how unbalanced the diet or how unclean the mouth, while others develop caries even though the diet, so far as we can tell, is entirely adequate and the care of the mouth perfect. One of these additional factors probably is heredity, and the functioning of the glands of internal secretion may be another.

### APICAL INFECTIONS

The so-called "apical abscesses" which develop around the roots of teeth are the most dangerous type of mouth infection. Infective organisms usually reach these areas by traveling from deep cavities down the pulp of the tooth and along the root canal. On the other hand, abscesses occasionally occur around the roots of apparently healthy teeth.

An infection at the root of a tooth begins as a small inflammatory area in the bone in which the tooth is embedded. Unless an abscess forms and works its way to the surface, becoming a so-called "gum boil," these infections cannot drain. The result is that their toxic products and even the bacteria themselves may be absorbed into the blood and lymph stream to be circulated throughout the body. The toxic products cause fatigue, lassitude, and various aches and pains, while bacteria which are absorbed may set up infections in the joints, kidneys, or heart valves. Abscesses at the roots of certain teeth of the upper jaw may extend directly into the antrum, producing one of the most severe types of sinus infection. The development of these root abscesses is usually accompanied by pain, but they may develop, particularly at the roots of "dead" teeth, without any warning whatsoever. The only satisfactory treatment is free drainage obtained by the removal of the tooth.

## GINGIVITIS AND PYORRHEA

Gingivitis means an inflammatory condition of the gums, while pyorrhea implies that actual pus is present. The normal gums are pink or light red in color, thin and firm. If they become bright red or purplish, soft, swollen, and spongy, or bleed easily, they should receive attention. The causes of an unhealthy condition of the gums may be faulty diet, mechanical irritation, or bacterial infection.

Vitamin C seems to be the dietary factor most directly related to the health of the gums. In scurvy, the disease due to vitamin C deficiency, a spongy, bleeding condition of the gums is a prominent symptom. Hanke reported that the addition of a pint of orange juice and the juice of one lemon to the daily diet lead to an almost complete disappearance of gingivitis.

Mechanical injury to the gums may result from the faulty use of the toothbrush or from the accumulation of tartar—lime-like deposits—on the teeth at the gum margin. Such mechanical injury causes irritation and is frequently followed by secondary infection.

Exercise and massage of the gums by biting and chewing assist in the maintenance of an adequate circulation and a healthy condition. For this reason it is important that teeth be kept in proper repair so that they will be used regularly and uniformly. Missing teeth and poor fillings prevent the proper use of the teeth in chewing. Gentle massage of the gums with the fingers or the toothbrush, using a stroke *toward* the gum margin, is helpful in maintaining good circulation.

Pyorrhea is a more severe infection of the gums which demands expert treatment. There is no mouthwash, toothpaste, or powder that will cure it.

*Trench Mouth.* A severe form of gingivitis which received special study during the First World War has been called "trench mouth." This is caused by a specific germ and is easily communicated from one person to another, either directly or indirectly through drinking glasses or eating utensils. The treatment of trench mouth is a problem for a physician or a dentist.

## CARE OF THE MOUTH AND TEETH

Cleanliness of the mouth and teeth is important from an aesthetic as well as from a hygienic point of view. It is difficult to keep the mouth clean in view of the irregularities in the shape of the teeth and the crevices between them. Nevertheless, by the regular use of the toothbrush and dental floss the teeth may be kept relatively free from deposits of food and mucus. The mouth should be cleansed upon rising in the morning, after each meal, and before retiring.

*The Toothbrush.* A small or medium-sized brush with a straight or slightly convex brushing surface seems to give the best results. The bristles should be relatively short and stiff, with the tufts widely separated and containing bristles of different lengths. The expense of the brush is not necessarily a criterion of its value.

Cold water should be used in brushing the teeth, for hot water softens the bristles. After using a brush, it should be washed and hung where it will become thoroughly dry before subsequent use. It is well to have several brushes which may be used alternately.

The teeth should be brushed on all surfaces which the brush can reach. Other surfaces should be cleaned with dental floss. A technique recommended for brushing the teeth is to place the brush against the teeth with the bristles slanting away from the gums. Then with a gentle, rotary motion work the bristles between as well as over the surface of the teeth. If there is a tendency for the gum margins to recede, the gums should be massaged with the brush when cleaning the teeth, using a gentle stroke toward the edge of the gum margin.

*Tooth Pastes and Powders.* The chief merit of dentifrices is that they are pleasant to use and encourage regularity in the care of the teeth. They contribute but little to the cleansing and nothing to the preservation of the teeth. Nor do they prevent pyorrhea and gingivitis. And the use of some dentifrices is actually worse than nothing at all, for they contain abrasive, gritty substances which wear down the enamel of the teeth. For

practical purposes, finely precipitated chalk or bicarbonate of soda with or without flavoring is an inexpensive, safe, and satisfactory dentifrice. The recently developed ammoniated dentifrices may prove to have real value in preventing caries.

*Mouthwashes.* The only merit which can be ascribed to mouthwashes is that they give a pleasing sensation of cleanliness. They have no antiseptic properties of any consequence. If the mouth is healthy, they are unnecessary; and if not, they are valueless.

There is some suggestion that the persistent use of some of the popular "antiseptic gargles" may be harmful. Whether or not this is correct, it is unintelligent for people to be cajoled into spending money for such preparations by the writers of advertising copy who know nothing about health and care less.

*Dental Care.* The selection of a competent dentist is of first importance in the care of the teeth. Cheap, incompetent dentistry usually means one of several things: decay left under fillings to infect the pulp and give rise to apical abscesses, poorly prepared cavities from which fillings easily become loose, badly fitting fillings which permit of decay around their edges, difficult work neglected, and good teeth sacrificed to poor judgment. In dentistry as in other things one does not get something for nothing. The ultimate cost of poor dentistry is much greater than the cost of good work in the first place.

A publication of the American Dental Association states that dental research has as yet found no way to prevent caries. The only satisfactory method of combating the disease is to fill affected teeth during the early stages of decay. Unless this is done, the teeth attacked by caries will be lost in almost every instance. Thus, the only logical present method of meeting the dental health need of school children is to fill all carious permanent teeth.

Teeth should be cleaned and examined at regular intervals of 6 or, better still, 3 months. The thorough cleaning aids in the prevention of decay and the examination discloses cavities when they are just beginning and as yet of minor importance. If cavities are properly filled when small, the progress of decay is

arrested and the structure of the tooth saved. To postpone or neglect necessary dental work is no economy. To be most effective, routine dental care should begin at the age of two. Dentistry is expensive, and even the most skillful reconstructive work is not nearly so satisfactory as sound, natural teeth.

*Halitosis.* Disagreeable odor of the breath may come from decayed teeth, from collections of decomposing food between the teeth, from infections in the nose or sinuses, from plugs in the crypts of the tonsils, or from malodorous volatile substances eliminated from the blood stream through the lungs. The conditions affecting the teeth can be corrected by dentistry and dental hygiene; nose and throat infections, by medical care. The excretion of unpleasant odors from the lungs can be reduced if not eliminated by diets of low fat content. Mouthwashes may temporarily mask unpleasant odors but they never really eliminate the odor or remove its cause.

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## Text-Films

The following McGraw-Hill Text-Film on Health Education is recommended for use with this chapter of the text.

*The Nose, Throat, and Ears* (11min sd motion picture).

Animated drawings in this motion picture describe the structure and functions of the ears, nose, and throat; it also clarifies the recommended procedures for their care.

Silent follow-up filmstrip based on material contained in the motion picture offers opportunity for review, testing, and further discussion.

*Chapter* XI

# THE CONSERVATION OF VISION

Good vision is essential for success in most occupations and for the enjoyment of the beautiful and interesting things of life. Uncivilized man was dependent upon acuity of vision for his subsistence and even for life itself, and we receive most of our education through our eyes, by means of observation, printed words, and pictures.

The eye is an extremely efficient instrument, functioning almost continuously to provide clear vision for close work in school, office, or shop. In so doing it acts with surprising rapidity, performing upwards of 1,000 movements in 5 minutes of reading. It has been estimated that one-fourth of the daily energy expenditure of persons in sedentary occupations is utilized for the purpose of seeing.

Physiologically the eye is a mechanism, much like a camera, which brings the rays of light to focus upon light-sensitive nerve endings in the retina. These, in turn, transmit a stimulus to the brain where the visual image is perceived. In the lowest types of seeing animals the eye consists merely of a few pigmented cells, sensitive to light, at or near the surface of the body, and connected with some simple nerve structure. In the higher forms of life these structures become more complex and connected with the brain. In addition to these more highly developed eyes, insects and worms retain some of the simple, supernumerary

eyes. Most spiders, for example, have eight, and some worms four or more such eyes.

The simplest type of eye can perceive only light, but as one proceeds up the biological scale the visual apparatus becomes more complex and begins to perceive size, shape, distance, and color. Since acute vision is an asset in the struggle for existence, the animals with the most efficient eyes tend to rise in the biological scale.

Until recently, biologically speaking, man lived out of doors and used his eyes chiefly for distance vision. Some change of focus was necessary, but the demands made upon the visual apparatus were but a fraction of what they have been since he changed his mode of living. Several million years of reading the printed page may bring about a better adaptation of these outdoor eyes to the manner in which we now live.

## The Cause and Prevention of Blindness

One of the greatest calamities that can befall one is blindness. The occasional genius, such as Milton or Helen Keller, can rise above this calamity, but most persons are crushed by it. It has been estimated that there are 100,000 blind persons in the United States and that in at least 50 per cent of these cases the blindness was due to causes which could have been prevented. Of these causes, the most important are injuries, infections, poisons, and degenerative diseases.

*Eye Injuries.* Injuries constitute an important cause of blindness in this country. Some of these for all practical purposes can hardly be called preventable, but the vast majority could be avoided with reasonable precaution. Children can be taught that they should not use sharp instruments and that certain toys and games are hazardous; industry can safeguard the vision of employees; and individuals can learn to take necessary precautions.

Most industrial eye injuries occur in such occupations as machine operating, chipping, grinding and polishing, mining and quarrying, riveting, welding and cutting, glassmaking, sandblasting, and woodworking operations. In these and other occu-

pations in which fragments of metal, wood, or stone may be thrown about, goggles or masks should be worn. The Chicago Division of the American Steel and Wire Company reports that eye injuries resulting in total loss of vision were reduced from 1 per 643 employees from 1910 to 1915 to 1 per 2,700 employees in 1927 to 1933, and that the reduction in partial loss of vision was from 1 per 750 employees in 1910 to 1915 to 1 per 9,450 employees in 1927 to 1933. This reduction was the result of the use of goggles and the adoption of other protective devices. Injuries on the farm, and in many other areas could likewise be greatly reduced by reasonable care and the use of protective goggles.

*First Aid in Eye Injuries.* Cleanliness is of the greatest importance in the care of eye injuries. A slight scratch on the surface of the eye may become so seriously infected that the eyesight is lost. The tissues of the eye are extremely delicate. For this reason expert medical attention should be secured whenever there is an injury to the eye.

*Cinders in the Eye.* Dust, cinders, and other small particles of foreign material frequently lodge on the surface of the eyeball. The irritation thus produced results in a flood of tears which usually washes the offending particle away. Occasionally, however, such particles become lodged under a lid and for this or some other reason refuse to be dislodged. In such cases closing both eyes for a few moments without moving the eyeball leads to the accumulation of tears so that with the opening of the eyes the particle may be flushed out. Rubbing of the eyes irritates the tissues and embeds the particle.

*Cosmetics Dangerous to Eyes.* Among the cosmetics offered for the enhancement of beauty are dyes for eyebrows and eyelashes. Some of these contain chemicals which are injurious to the delicate structure of the eye; hence, their use is distinctly hazardous.

*Eye Infections.* Mild infections of the eye, such as those which frequently accompany common colds, usually clear up with simple treatments. The more severe infections, on the other hand, require medical attention. These may be acute and self-limited or they may be due to serious disease, such as trachoma

or gonorrheal ophthalmia, which, if not properly treated, will result in blindness. All infections of the eye are communicable and care is necessary if infection of others is to be avoided.

An inflamed, granular condition of the margins of the eyelids and the development of sties are frequently associated with eyestrain and with general ill-health. For such conditions a complete physical examination and a careful refraction are more important than local treatments.

*Poisons Affect the Vision.* Among the poisons which may produce partial or complete loss of vision are tobacco, wood alcohol, and quinine.

Many persons use tobacco for years without any apparent effect upon visual acuity, but others are definitely harmed by it. The eyes tire easily, visual acuity becomes progressively diminished, color vision is lost, and use of the eyes causes severe headache. Such symptoms occur most commonly in pipe smokers, particularly if both tobacco and alcohol are used in excess. If tobacco and alcohol are discontinued completely, the symptoms usually disappear rapidly and vision returns to normal. Such loss of vision occurs most commonly in men who smoke half a dozen or more cigars a day or several ounces of pipe tobacco a week.

Quinine probably has caused more blindness than any other one drug. Ringing of the ears, headache, partial deafness, and dizziness are the common toxic symptoms produced by quinine. Less frequent but more serious is loss of vision, which may be partial and temporary or absolute for days, weeks, or life. A knowledge of the possibility of serious harm from the use of this drug should make people less willing to consume it, without medical advice, in various patent medicines for the treatment of colds, fever, and malaria.

*Cataracts.* Various changes which impair vision may occur in the eye during the later decades of life, but most common of these is a cloudiness of the crystalline lens or its capsule, called "cataract." Occasionally this is due to injury or disease but the most common type is the senile cataract, the cause of which is not understood. In the past a cataract was considered a hopeless

sentence to blindness for the rest of one's life, but now useful vision can be restored in 97 per cent of patients by means of a simple but delicate operation.

*Glaucoma* is a serious eye disease which is responsible for one-third of all blindness after forty years of age. Mechanically this is due to an increased pressure within the eyeball. This much we know, but since the basic cause for the increased pressure is not understood we do not have the key to its prevention. However, if glaucoma is recognized early and proper treatment instituted, its progress frequently can be arrested. The early symptoms are headache, pain in the eyes, halos surrounding lights, and rapid loss of vision. Although these symptoms may be due to other causes, their presence makes a careful examination by a competent physician imperative.

## Eyewashes

Advertisements for eyewashes with fancy names suggest that these preparations should be used regularly if one desires bright, sparkling, healthy eyes. Eye specialists, on the other hand, never recommend such practices. Dust and dirt are constantly settling on the eyeball but nature removes them by maintaining a constant flow of tears which are gently carried over the eyeball by blinking of the lids. If there is unusual exposure to dust, smoke, or other irritating substances, a few drops of a saturated boracic acid solution may be soothing.

## Common Visual Defects

The common visual defects are nearsightedness, farsightedness, and astigmatism. These rarely lead to blindness but they are responsible for an enormous amount of discomfort and inefficiency. Except for the farsightedness of advancing age, these visual defects are due to developmental abnormalities in the shape of the eyeball. It has been suggested that race and heredity as well as other factors play a part in their causation, but relatively little is really known concerning their actual cause.

The mechanism of vision requires, first, that rays of light be reflected from an object to the eye. On a dark night we are un-

able to see objects about us because insufficient light rays are reflected from them, but we can see the new moon which out beyond the earth is reflecting the light from the sun.

After reaching the eye these rays of light must be bent, or refracted, so that they will come to focus upon the proper part of the retina. This bending, or refraction, of the light rays is done in part by the curved surface of the front of the eye but chiefly by the crystalline lens which is suspended within the eyeball. The thicker this lens, the greater will be the curvature of its surface and the more sharply will the rays of light which pass

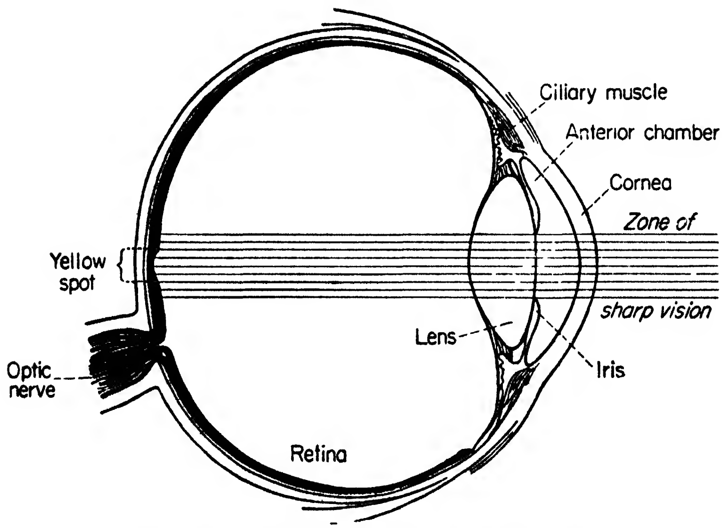



FIG. 8. DIAGRAMMATIC SECTION OF NORMAL EYE.

through it be focused. The thickness of the lens is controlled by a ring of tiny muscles, the ciliary muscles, which surround it within the eyeball.

When one looks at a distant object, a near one in the same line of vision is indistinct. Now, if one focuses upon the nearer object, the distant one is not seen so well. This is because a clear image is obtained only of the object which is brought to focus upon the most sensitive portion of the retina. The other becomes indistinct as it goes out of focus. This shifting of focus is accomplished by a change in the thickness of the lens. In a normal eye

the rays of light from a distant object come to focus upon the retina when the eye is at rest, that is, when the ciliary muscles are inactive and the lens is thin.

*Farsightedness of Children.* In this condition, called "hyperopia," the eyeball is shorter than normal. This is a universal condition at birth but should disappear before there is much use of the eyes for near vision. If it persists, the rays of light with the eye at rest come to focus not on the retina but behind it. Blurring of vision results. This is unsatisfactory, so the ciliary muscles correct the difficulty by contracting and making the lens thicker, thereby bringing the point of focus forward until it is on the retina. This gives clear vision but requires excessive work on the part of these muscles. For short periods of time this gives rise to no difficulties but if it continues muscular fatigue is inevitable. This in turn causes headache, pain in the eyes, nervousness, and general fatigue. This type of visual defect is the one which causes the most severe symptoms of eyestrain.

Important though farsightedness is as a cause of eyestrain, it is rarely discovered by the ordinary vision test, because during the test clear vision is secured by excessive use of the ciliary muscles. Hence, if a child brings a report from school that his vision test shows 20/20 in each eye this should not be accepted as conclusive evidence that the eyes are normal. If symptoms of eyestrain are present, a further examination is indicated.

*The Use of Drops for Eye Examinations.* There have been much misunderstanding and misinformation concerning the use of "drops" for the examination of the eyes. The drops contain a drug, such as atropine or homatropine, which temporarily paralyzes the ciliary muscles. Unless this is done, the activity of these muscles in persons under about forty years of age makes the accurate measurement of certain visual defects impossible. Everyone who needs glasses should have a thorough eye examination, and for a young person this implies the use of drops.

*Squints and Cross-eyedness.* Sometimes the degree of farsightedness in one eye of a child may be greater than in the other, or one eye may be farsighted and the other normal or relatively normal. When this occurs and both eyes are used, the one eye is

under a much greater strain than the other. Since reasonably good vision can be obtained with the use of only one eye, in time the overworked eye ceases to function, first when it gets tired and then continuously. The child does not know that he is using only one eye and for a time no change is noticeable. Eventually, however, the muscles which turn the farsighted eye toward the object of vision seem to realize that, since the eye is not being used, their work is unnecessary, so they too stop working and the condition which we call "cross-eyedness" develops. At first this appears only when the child is tired but eventually it becomes constant. After the unused eye has been fixed in one position for some time, the muscles on the one side of the eyeball become shortened and those on the other side stretched. The condition, however, is the end result and not the cause of cross-eyedness.

The prevention or treatment of cross-eyedness clearly must be based upon a thorough eye examination with all muscles, overacting and underacting alike, put at rest. On the basis of such an examination glasses can be prescribed which will tend to equalize the work of the two eyes and so prevent further progress of the condition. To be successful, however, this needs to be done in early childhood, just as soon as squinting is observed. If the disuse of the one eye has become an established habit, it may be necessary to cover the other eye temporarily in order to put this one back to work.

*Farsightedness of Later Years* (*Presbyopia*). The crystalline lens of a young child is very elastic and the ability to focus the vision upon near objects correspondingly great. With increasing age the lens loses its elasticity and the power of accommodation is correspondingly reduced. At thirty years of age the power of accommodation is only one-half as great as at ten years of age and at forty-five only one-half as great as at thirty. At the approximate age of forty-five the near point for comfortable vision reaches about 12 inches, the distance ordinarily used for reading. After this age, most persons need glasses in order to read with comfort; and since the condition tends to be progressive, the glasses need to be changed every 1 to 3 years.

*Nearsightedness, or myopia,* occurs when the eyeball is longer than normal. For this reason with the eye at rest the point of focus of distant objects falls in front of the retina and indistinct vision results. The use of the ciliary muscles to make the lens thicker would only move the point of focus farther forward and so make matters worse. Hence, the only way for a nearsighted person to obtain clear vision, without glasses, is to bring the object close to the eye. The glasses prescribed for myopia throw the point of focus backward toward the retina, thereby increasing the acuity of vision.

Although nearsightedness tends to run in families and is more common in some races than in others, its actual cause is unknown. It frequently appears in childhood and progresses somewhat until about the age of twenty-one. Hence, it sometimes has been suggested that nearsightedness may be due to school work. On the other hand, it seems that the condition is just as frequent and develops just as rapidly in children who are out of school as in those who are in school.

Nearsightedness occasionally becomes progressive and if not arrested may lead to serious impairment of vision. Some such cases are associated with malnutrition, focal infections, or general ill-health. Thus the boy or girl with progressive nearsightedness should be placed under the care of a competent oculist and a general physician.

*Astigmatism.* Astigmatism is a type of visual defect due to an irregularity in the curvature of the portions of the eyeball through which the light rays enter; that is, the cornea and the lens. If either of these surfaces is flatter than normal, there is less bending of the rays of light with the result that the point of focus is thrown backward. On the other hand, if the curvature is greater than normal, the point of focus is farther forward. In addition to these possibilities some eyes are flat in one direction and excessively curved in the other, and the abnormal curvatures which we call "astigmatism" may be associated with either nearsightedness or farsightedness. Such visual defects frequently cause severe eyestrain. To obtain relief a careful eye examination and accurately prescribed and fitted glasses are essential.

## Eye Specialists

There are several groups of individuals who, with more or less justification, consider themselves eye specialists. It is important to be able to distinguish among these and to understand the service which each is qualified to render.

The oculist or ophthalmologist is a graduate physician who first had a basic training and practical experience in general medicine and surgery and then specialized in diseases of the eye. He realizes that eyestrain or visual defects are frequently associated with and may be the first recognizable sign of disease, either in the eye itself or in some other part of the body, and he considers all such possibilities when making an eye examination. Furthermore, physicians are the only persons permitted to treat disease or to use the drugs which are so necessary for complete eye examinations of young persons. If, after a careful examination, glasses are deemed necessary, the oculist writes a prescription for them which is taken to an optician to be filled.

Opticians are craftsmen, skilled in the grinding of lenses and the making and fitting of glasses according to prescriptions. If eyestrain is to be relieved, lenses must be accurately ground and glasses carefully fitted. It is essential also that frames and nosepieces be kept in proper adjustment. In some cases of astigmatism even a slight displacement of a lens from its proper position will cause discomfort.

Optometrists are licensed to make visual tests and to prescribe glasses. They are not trained to treat diseases, but graduates of approved schools of optometry are trained to make proper references to physicians. Some optometrists do not limit themselves to the examination of eyes but engage in the selling of glasses or are associated with some store which does so.

Most of the glasses worn in this country are prescribed and sold by optometrists. Many optometrists render valuable services as competent, conscientious, and ethical practitioners. Others are primarily businessmen engaged in the selling of glasses for profit. Fortunately the proportion of ethical optometrists has been increasing rapidly over the past 15 years. These

are reputable practitioners and truly merit the title of professional men. Theirs are not the names one sees blatantly advertised.

A word of sound advice for anyone who has or who thinks he has eyestrain is to investigate thoroughly before consulting those who advertise "Eyes examined free." Such establishments are business, not welfare, institutions. They examine eyes free, but they make their profit by selling glasses. Hence those who may need glasses should be very careful with whom they consult.

Then there are the "eye specialists" who travel about proclaiming some "newly discovered method" for correcting defective vision without the use of glasses. They usually start with a free lecture but collect the money later. It is amazing how many credulous people pay these fakers for a course of lectures, a book of instructions, or some other equally worthless commodity. As soon as fees begin to dwindle, such specialists hear a call to spread the "gospel" elsewhere.

## Illumination

Although poor lighting is an important factor in the development of fatigue and eyestrain, there is no satisfactory evidence, the advertising of electric light companies notwithstanding, that poor illumination is a cause of defective vision.

The essentials of good lighting are that the light be adequate, uniform, and steady and that glare and shadows be avoided. Under no circumstances should the source of light be in the line of vision. For reading and close work the whole room should be well lighted with additional light centered upon the work. A well-lighted room is bright and cheerful, a poorly lighted one gloomy and depressing. Good lighting improves the spirits, increases efficiency and productivity, and decreases accidents.

In rooms where no close work is done, 1 to 3 foot-candles[1] of illumination are sufficient; classrooms, libraries, and desks should have at least 10 to 15 foot-candles of illumination on top of the desk; and for finer work, such as drawing or sewing, 20 to 100

[1] A foot-candle is the amount of light at a distance of 1 foot from the flame of a candle of ordinary size, that is, approximately 1 inch in diameter.

foot-candles of illumination should be provided. An unshaded, 75-watt gas-filled argon and nitrogen bulb will provide 9 foot-candles of illumination at a distance of 3 feet, 2 foot-candles at a distance of 6 feet, and about ½ foot-candle at a distance of 12 feet.

The color of the walls and ceiling of a room has a distinct influence upon the amount of light necessary to give adequate illumination. Light colors reflect the light; dark colors absorb it. The illumination at any point in a room is received in part directly from the source of illumination and in part from light which is reflected from the walls and ceiling. The type of shade or reflector over a light makes a great difference in the illumination obtained from it. In fact, many of the most decorative shades render lights practically useless for illumination. In the selection of a lamp to be used for reading or close work the stamp of approval of the Illuminating Engineering Society (I.E.S.) gives assurance that the lamp is properly designed to give good illumination.

## Glare

Bright light which strikes the eye directly from an unshaded source or is reflected from objects such as glossy paper, polished furniture, clean white snow, or the hood of an automobile causes contraction of the iris with resultant unequal stimulation of the retina. This is commonly described as "glare" and is responsible for a considerable amount of unnecessary eyestrain.

Sunglasses of various sizes, shapes, and hues have become synonymous with sports and vacations from Florida to Alaska and from seashores to mountaintops. As a result they are worn much more extensively than any real need for them would justify. Our eyes possess the capacity to adjust themselves to varying degrees of light intensity. It is a mistake, therefore, to make a habit of wearing sunglasses whenever one is in bright light. On the other hand, there are situations in which the light is so brilliant or accompanied by so much glare that one is more comfortable if some of this light, particularly the ultraviolet light, is filtered out by special glasses. As a general rule, such

glasses should not be worn indoors and should be put on out of doors only when the light is particularly bright. There are many kinds of sunglasses offered for sale and probably most of them are reasonably satisfactory. One should be certain, however, that such glasses do not contain irregular curvatures or flaws that will contribute to eyestrain. For persons whose eyes are particularly sensitive to light a little tinting of the glasses regularly worn may provide some comfort.

## The Care of the Eyes and the Prevention of Eyestrain

Eyes will stand considerable abuse, but if one expects efficient service from them day after day and year after year, they must be given reasonable care. When used for close work, the eyes should be rested at frequent intervals by looking at a blank wall or at some distant object. During illness and convalescence they are susceptible to fatigue and so should be used sparingly. They need protection during infectious diseases, particularly measles.

Reading in bed frequently produces eyestrain because the book, magazine, or paper is not held in a proper position, and lighting is inadequate and poorly placed. Likewise, reading with an unsteady light or on a moving train is very fatiguing and likely to cause severe eyestrain. Adequate, steady, and properly located illumination is essential for comfort in the use of the eyes.

Goggles are useful to protect the eyes from dust and wind and are the most important single measure for the prevention of eye injuries in numerous occupations. Tinted lenses reduce the irritation from the glare of the sun in summer and the reflected light from the snow in winter.

When symptoms of eyestrain or of defective vision occur, the eyes should be examined by a competent oculist. However, not everyone with symptoms of eyestrain needs glasses. It is important also to realize that the condition of the eye and the general health are closely related. Defective vision may be due to a specific disease or may be aggravated by poor general health, and eyestrain may give rise to symptoms in remote parts of the body. Finally, when the eye is involved, the best service is

none too good, for the possibility of preventing progressive loss of vision and eventual blindness may depend upon the early recognition and proper treatment of glaucoma, trachoma, progressive myopia, or certain general diseases or toxic conditions.

READING SUGGESTIONS

1. Gradle, Harry: "Hygiene of the Eye," Health and Life Series, Manning Company, Chicago, 1931.
2. Bulletins of the National Association for the Prevention of Blindness, New York.
3. Conservation of Vision Pamphlets, American Medical Association, Chicago.

# Chapter XII

# CARE OF THE SKIN AND HAIR

The average person spends more time and money on the care of the skin, the hair, and the nails than on medical and health services. This is most illogical, for the appearance of the skin and hair is dependent more upon the general health of the body than upon the use of cosmetic preparations.

The appearance of the skin, hair, and nails is important. A careless unattractive appearance is a handicap in the business as well as in the social world. In addition, morale is improved and self-confidence bolstered by a good appearance.

The skin, of which the hair and nails are inert appendages, performs several important functions:

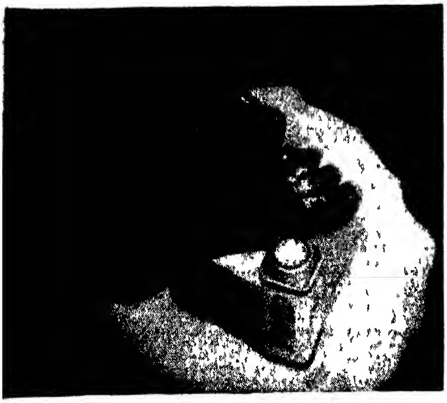
1. It protects underlying organs and tissues against injury. Very few germs can penetrate the unbroken skin. Blisters and calluses develop to protect underlying tissues from injury. Tanning keeps out the irritating rays of the sun.

2. It plays an important role in the regulation of body temperature. The various metabolic and vital processes of the body produce heat which must be eliminated. If this heat is accumulated in the body, heat stroke or heat exhaustion follow. Most of this heat is lost from the skin by radiation to the surrounding air or by the evaporation of perspiration.

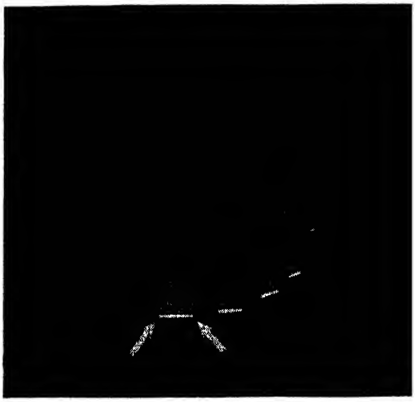
Blood flow through the skin is important in controlling the rate of heat loss. When the body is hot and heat loss is essential,

Sweat glands bring dirt to the surface of the skin.

A daily shower is the first step in immaculate groo



Powder rubbed between the toes when they are completely dry can help prevent athlete's foot.



Toenails should be clipped straight across to avoi grown nails.

An unattractive appearance is more often the result of carelessness than any physical defect.

Shining hair, clean teeth, immaculate skin, and car taste in dress add up to a charming appearance.

*(From Body Care and Grooming, a McGraw-Hill Text-Film)*

the blood vessels of the skin dilate, causing an increase in blood flow and a flushed or red appearance of the skin. The increased blood flow in turn causes an increase in radiation and a stimulation of perspiration. An individual who perspires easily is able to adjust to high temperatures better than the person who perspires with difficulty. Excessive heat loss or chilling causes constriction of the blood vessels with blanching and discontinuance of perspiration.

3. It provides a sensory covering for the body. The nerve endings in the skin give rise to sensations of touch, pressure, pain, heat, and cold. As a result of these sensations, many bodily processes and actions are controlled.

4. It serves as an accessory excretory organ. Most metabolic waste products are picked up by the blood and eliminated through the kidneys. The skin, however, also contributes to this function. Under ordinary conditions and moderate activity, 2 to 3 quarts of perspiration, containing salt and some urea and uric acid, are eliminated each 24 hours.

## Care of the Skin

The most important factors in maintaining the health of the skin are those same factors important for maintaining the health of the rest of the body—adequate rest, exercise, proper diet, and cleanliness. Attention to these general rules of hygiene will do more to produce a clear, attractive skin than the application of the many different types of so-called "skin foods" advertised so freely. Of these hygienic practices, cleanliness is all-important in preserving a good complexion.

The face should be washed at least once daily with warm water and a mild soap. For those whose skin is unusually oily, a cleansing with soap twice a day may be necessary. The idea of cleaning the face with cold cream *only* is scientifically unsound. The skin of the face is constantly exposed to dirt which, with the fatty secretion from the oil glands in the skin, causes an accumulation of dirt and fat on the face. If oils and creams are used as a substitute for soap and water, this accumulation of oily dirt on the face is never completely removed and may

be a cause of skin disorders. For those whose skin is unusually dry, an application of cold cream at night after the face has been thoroughly cleansed with soap and water may be beneficial. It is not harmful even for the less dry skin but may be harmful for those who have a tendency to acne.

*Chapping* of the skin occurs most frequently in cold weather when the activity of the oil glands in the skin is reduced. Too frequent washing with strong soap removes oil from the skin and makes it more susceptible to chapping. Protection of the skin against wind and cold and the use of oil, cold cream, or glycerine reduce the likelihood of chapping.

## Skin Disorders

*Acne.* Acne is one of the common skin disorders of young adults and may be a source of great discomfort and humiliation. Acne is an inflammation around the oil glands and pores. During the adolescent and early adult life the oil glands and other glandular structures develop a new activity. A chief cause of acne is an excessive secretion of oil with the formation of blackheads. Only a few lesions may develop, or they may be numerous. They usually occur on the face, chest, and back. Because permanent scarring may develop in severe cases, it is wise for the person having acne to have treatment by an experienced dermatologist. For the mild cases the thorough cleansing of the skin once or twice a day with soap and warm water is important. Likewise a diet should be followed that avoids greasy foods, pastry, and large amounts of carbohydrates and chocolate. While acne may be very distressing during the early adult years, in nearly all cases the condition disappears in the early twenties.

*Boils.* Boils are infections that are usually caused by a staphylococcus that enters the skin along hair follicles. The common belief that boils are due to "bad blood" is erroneous. An excessive amount of sugar in the blood increases the susceptibility to boils but this is hardly "bad blood." Persons with boils should eat less sugar and starches and should have their urine examined by a physician. Occasionally this will lead to a diagnosis of diabetes.

Boils are infectious and may be spread from one part of the body to another or from person to person by contact, clothing, towels, etc. Boils should be covered and cared for by a physician.

*Athlete's Foot and Ringworm.* This widespread condition is caused by a fungus (mold) which penetrates the superficial layers of the skin. It occurs most frequently in the damp warm skin between the toes. Early signs are areas of moist whitish skin between the toes and cracking of the skin. Unless secondarily infected, infections with this fungus are rarely incapacitating.

The fungus or mold which causes this disease is widespread. The infection is usually contracted from the floors of locker rooms, showers, bathrooms, and swimming pools where people walk barefoot. Careful washing of the feet, including between the toes, with soap followed by thorough drying reduces the likelihood of infection. Individual towels, washcloths, and bath slippers should be used.

A similar fungus, usually complicated by infection with a staphylococcus or streptococcus, may occur on the face, where it is commonly known as "barber's itch." The transmission is by means of razors or towels.

A fungus known as "ringworm" may also become established on the skin or in the hair. On the skin it causes circular scaly patches which tend to heal in the center and extend peripherally. In the scalp the fungus penetrates the shafts of the hairs, which causes them to break off and to leave small round bald areas. This condition is found commonly in school children. It is spread primarily by means of combs and brushes or by means of caps and hats that have been worn by infected persons.

*Warts.* Warts are caused by a specific virus which produces cauliflowerlike overgrowths of the horny layer of the skin. They appear and disappear without apparent cause. Warts may occur on the soles of the feet and may become so painful that removal is essential. The removal of a wart should be done by a physician.

*Moles.* Moles are an overgrowth of the deeper pigmented layers of the skin. Most moles are harmless but occasionally one develops into a malignant cancer. Chronic irritation from clothing, shaving, etc., may stimulate a mole to sudden growth activ-

ity. Most moles in a location where they are subject to irritation should be removed by a competent surgeon.

*Birthmarks.* A "birthmark" is a term applied to discoloration or pigmentation of the skin from an abnormal condition of surface blood vessels. The name merely indicates that these markings are usually present at or appear immediately after birth. The superstition that birthmarks are due to some prenatal influence or fright on the part of the mother is without foundation. Although birthmarks are rarely dangerous, they should not be irritated.

*Scabies (the Itch).* Scabies is one of the most common of the skin diseases and is frequently seen in charity clinics and hospitals. It is caused by the itch mite, which burrows under the skin and lays its eggs. The mite is most frequently found between the fingers. Scabies is transmitted from one person to another by direct contact and indirectly by the use of bedding, gloves, or underclothing of an infected person. It is readily controlled by the exclusion from school and isolation of infected children and the disinfection of clothing and bedding. Certain drugs which destroy the itch mite can be applied to the infected person. Complete elimination of the mite usually requires several days of treatment.

*Pediculosis.* Pediculosis is an infestation with lice. There are three common types of louse which infest human beings: the head louse, the body louse, and the crab louse. The louse usually is found in the hairy parts of an infected person. The presence of pediculosis is usually a result of uncleanliness. It is frequently said that it is no disgrace to get lice but it is to keep them. Pediculosis is transmitted by direct contact with someone infested or indirectly by contact with clothing or bedding of such a person. Pediculosis can be controlled by the recognition of the state of lousiness and proper measures to remove the lice and the nits. Constant precautions are necessary to prevent the entry of lice into hospitals.

*Impetigo Contagiosa.* Impetigo is a purulent dermatitis which characteristically develops as small blisters, weeping lesions, and crusts. It is most common on the face and hands. Impetigo is

caused either by staphylococci or streptococci. It is transmitted from one person to another by direct or indirect contact. The person who has impetigo may spread the disease from one part of the body to another by scratching. While impetigo is more commonly found among children, especially in warm weather, it may also occur in adults. In the pediatric wards of hospitals great care must be taken to prevent the spread of impetigo, should a child be admitted with the infection. The treatment consists of local application of drugs. Ointments containing one of the sulfonamide compounds have been found to be very effective. The prevention and control of impetigo depend upon the recognition, isolation, and prompt treatment of infected individuals.

*Urticaria.* Urticaria, commonly known as "hives," consists of small pink and whitish elevations of the skin, which have the general appearance of insect bites. They are of various sizes, ranging from the size of the head of a large pin to a wheal a half inch or more in diameter. They represent an allergic reaction to a substance that is either brought into direct contact with the skin or absorbed by the respiratory or intestinal tract and carried throughout the body in the blood stream. In either type, itching is usually severe.

Localized urticaria may result from insect bites in case the individual is sensitive to the formic acid introduced by the bite of the insect. It may also be due to some substance such as wool, dyes, lacquers, etc., to which he is sensitive. Generalized urticaria is usually due to the inhaling or eating of material to which the individual is sensitive. Elimination of this substance from the diet or environment is the most effective preventive measure.

## Cosmetics

A clear skin and attractive hair are assets to beauty and so desired by every woman, young or old. That the appearance of the skin and hair are related to the general health of the body is too frequently forgotten by many women. The advertising propaganda of the cosmetics industry has led women to believe that the source of beauty is in a jar or bottle and that a good com-

plexion can be acquired only through the use of a certain cream, powder, or rouge. The woman of today who refrains from using cosmetics is conspicuous. The intelligent woman must know, however, that cold cream or hair lotion cannot be a substitute for the attractiveness that good health gives to the skin and hair, and that they should be used only to complement the beauty with which Nature has endowed the healthy person.

Since training in the sciences has become so large a part of our educational system, it is amazing to find the widespread belief in the magic claims in advertisements made for products manufactured from quite ordinary ingredients. Just pick up the current issue of any of the so-called women's magazines and turn to almost any cosmetic ad. Whether it be rouge, lipstick, cold cream or turtle oil cream, you get the impression that all a woman has to do is invest in five or six essential cosmetics and she will in short order acquire the lure of an oriental houri plus the finish of a Hollywood actress. . . . These extravagant claims, alas, have no basis in fact. The little brochures that read like the Arabian Nights' entertainment and are illustrated with pictures of lovely women are the product of imagination, not science. There is no Santa Claus, no magic lamp or ring in real life that can grant one's fond desires in these matters. There are certain things that a few simple cosmetics will do.[1]

Cosmetics should be used to improve appearance and not to disguise disorders of the skin due to poor hygiene or skin diseases. The commonly used types of cosmetics are face creams of various types, face powders, and rouge. If these preparations are pure, they may be used without harm.

The function of a *face cream* is to lubricate the skin and to prevent roughness and chapping. Manufacturers of cosmetics advertise special creams that are so-called "tissue building" or "nourishing creams" or "skin foods," supposed to have some particular value to the skin. The idea that one should use three or four different types of cream is merely a clever sales scheme. Ordinarily plain cold cream is probably the safest and most satisfactory type to use. The cost of such a cold cream varies with the manufacturer. If the company has obtained the endorsement of well-known society women, the cost of such endorsement will be added to the cost of the cold cream. The formulas of the many special-purpose creams may be somewhat different from

[1] Phillips, M. C., "Skin Deep," Vanguard Press, New York, 1934.

cold cream, but the physiological effect on the skin is only that of lubrication.

The type of cold cream called "vanishing cream" is actually a kind of soap. When such creams are rubbed into the face, it is merely the equivalent of leaving soap on the face after washing. Because of this, vanishing creams tend to dry the skin. For women who have an oily skin, usually no irritating effect from the vanishing cream will be noted, and the face powder will stay on for a longer period of time. For the dry skin, vanishing cream will increase the dryness and may cause actual scaling and roughness of the skin.

*Face powders* usually contain talcum, magnesium, French chalk, and starch or rice powder. A few years ago many face powders contained lead, mercury, or bismuth, all of which are definitely harmful. Face powders also have been made with orris root, to which many individuals are allergic. At the present time there are few face powders made by reputable manufacturers that contain any of these undesirable ingredients.

The sensible procedure to follow in selecting a face powder, provided you are not sensitive to rice or wheat, starch or orris root, is to buy the one whose color and perfume best suit you. There is no particular advantage in buying a high-priced powder unless you wish to pay an exorbitant price for a fancy container or a particularly appealing perfume. The less expensive varieties, such, for example, as the larger size boxes containing comparatively unknown and unadvertised brands found at the five-and-ten-cent stores, will serve equally well and will probably, with the exceptions already mentioned, be entirely safe to use. It is pathetic to watch girls employed at a very low salary skimp on their lunches or go hungry in order to buy an expensive, much advertised box of powder in the belief that they are purchasing something that will have a matchless or magical effect on their appearance. An adequate meal will have a far more beneficial effect on their general health, which is the most important factor in good looks.

One last word of caution—be sure your powder puff is clean, and never use another person's powder puff. Your neighbor's germs may be unfriendly to your complexion.[2]

*Rouge and lipstick* also are usually harmless cosmetics and if used skillfully may contribute much to one's attractiveness.

[2] *Ibid.*

The chief danger is in those which may contain certain aniline dyes to which some people may be allergic. Consumers' Research has had a number of popular brands of lipstick and rouge analyzed for dangerous ingredients, and several of the commonly advertised brands were found to be free from most undesirable substances. Even these, however, may not be safe for the occasional individual who may be sensitive to a certain perfume or dye which may be harmless for the majority of people.

The use of *eyebrow and eyelash dye* is still hazardous. In 1933 the *Journal of the American Medical Association* reported a case of a woman who had used Lashlure dye and as a result lost her eyesight. This particular eyelash dye contained a poisonous substance. Since that time the Federal Food and Drug Administration has prevented the sale of eyelash dyes containing this particular poison. In some states and cities laws were passed prohibiting the sale of this cosmetic preparation because of the large number of injuries that resulted from its use. *Mascara* is probably one of the less dangerous preparations to use on the eyelashes, although even this irritates the eyes of some people.

> Rouge to give your cheeks the natural color of physical health will probably leave no ill effects. Lipstick had better be used cautiously, both for the sake of good taste and your health. Lips are too sensitive to run the risk of possible irritation. Eyebrow and eyelash dyes and other eye preparations one would better avoid altogether. . . . The risks involved in use of dangerous eye color run all the way from irritation to total loss of sight. Even if you have been lucky up to the present time, don't take any more chances.[3]

*Depilatories.* A depilatory is a substance that removes hair. For this purpose the common methods are shaving, scraping the skin with pumice stone or emery board, or the use of hair removers, of either the chemical or wax variety. None of the above methods removes the hair permanently, as they have no effect on the root of the hair, which is the source of growth. The only safe method of permanently removing hair is by electrolysis. In this method an electric needle is inserted into each individual hair follicle, thus destroying the hair root. Unless this is done by an expert, it may cause scarring. Because each hair must be

[3] *Ibid.*

removed separately this is an expensive method of hair removal.

There is a common belief that shaving causes hair to grow out thicker and coarser than it was before. That this superstition has no foundation in fact was shown by a series of experiments conducted by Drs. C. H. Danforth and Mildred Trotter of Washington University School of Medicine. They had three girls shave the left leg from knee to ankle twice a week for eight months. After the hair had grown out again microscopic examination of the hairs of the left leg and the right leg which had not been shaved showed that there was no demonstrable difference between the hairs after shaving and the hairs on the leg which had not been shaved.

Chemical and wax hair removers are not entirely safe to use. In some individuals they cause irritation of the skin and may even cause a skin infection. Some of these preparations which are on the market claim to remove the hair permanently. Such claims are entirely false.

The only safe method which can be recommended for removing hair is the safety razor. One can be sure that there is no danger of skin irritation or poisoning from any chemical and need also have no fear that shaving will cause the hair to grow out coarser than it was before. Plucking the hair is also a safe method of removing hair but obviously is very time-consuming. Hair should never be plucked from a mole, as this may cause irritation of the mole.

## Deodorants

Body odor is caused by fatty acids that are formed as a result of decomposition of sweat. For those individuals who perspire excessively, the prevention of body odor may be an important consideration in personal hygiene. Since such body odor is caused by perspiration and the fatty acids formed from the sweat, the most important remedy in its prevention is frequent bathing, frequent changing of the clothes, and, in some instances, the use of a deodorant. There are two types of deodorant commonly advertised—those which deodorize the perspiration without restricting its flow, and those which both deodorize and stop the

flow of perspiration. The first type depends for its action upon such ingredients as boric acid, benzoic acid, or zinc stearate, and may be obtained either in a dry or paste form. It is usually harmless to use. The second type, which also diminishes the flow of perspiration, depends for its value on aluminum chloride, tannic acid, or zinc sulphate. While many people may use this type of deodorant without harm, in some preparations the solution may be so strong that it will cause a skin rash or other discomfort in sensitive individuals. If this type of preparation is used, it should be used no oftener than is absolutely necessary.

## The Hair

The same general principles of good hygiene which are used in the care of the skin also apply to keeping hair healthy. The hair, as is true of all other structures of the body, gets its nourishment from the blood. If the general health is good, the hair and scalp will be healthy. Again cleanliness is one of the most important aids in keeping the hair attractive. The hair, like the skin of the face and hands, is exposed to smoke and dirt. To keep the scalp and hair clean the hair should be washed at least once every two weeks with a pure mild soap. For some people a weekly shampoo is necessary. Daily brushing of the hair will aid greatly in preventing the accumulation of dirt and in keeping the hair attractive.

Excessive dryness, excessive oiliness, excessive dandruff or falling out of the hair are not normal and indicate that something is wrong. A physician should be consulted. Certain types of dandruff which cause a thick oily scale to appear upon the scalp are due to a germ infection and should be treated as such by a physician. The more common type of dandruff, causing dry scales to appear upon the scalp, is usually a symptom of unhygienic habits of living such as lack of sleep or excessive nervous strain or sometimes of improper diet. Most of the so-called "dandruff cures" which are advertised are of no more value in curing dandruff than are soap and water, though they may improve the appearance temporarily. Hair oils may be used by those with dry hair and scalp if it is not due to disease. The oil

need not be expensive. Mineral oil or olive oil, with perfume if desired, is satisfactory.

Hair dyes of all types are to be avoided. While some of them may be used over a period of time with no apparent ill effects, others contain dangerous substances which may cause severe damage to the skin or eyes, and in some cases even may be absorbed and cause kidney damage. The bleaches that remove the color from the hair and enable a brunette to become a blonde at her pleasure are probably not harmful, although they may leave the hair dry and brittle.

The permanent wave is a method of curling naturally straight hair by the application of chemicals and heat. When carefully and skillfully done, the permanent wave probably has no harmful effect on the hair. The heat may, however, make the hair dry, but this effect is usually not lasting.

Bald and balding American men are spending millions of dollars for futile hair-saving and dandruff-curing treatments. Baldness in most persons is hereditary. In others the cause is unknown. Neither massage, "hair tonics," mechanical devices, ultraviolet light, hormones, vitamins, nor any other treatment will prevent baldness or cause hair to grow in bald spots.

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## Text-Films

The following McGraw-Hill Text-Film on Health Education is recommended for use with this chapter and with Chapter X.

*Body Care and Grooming* (17min sd motion picture). This film develops the theme that good grooming starts with daily personal care, and describes a routine of recommended health habits. Emphasis is laid on the desirability of good grooming as a basis for social acceptability among young people. Animated drawings explain basic health arguments for clean hair, nails, teeth, skin, etc.

Silent follow-up filmstrip based on material contained in the motion picture offers an opportunity for review, testing, and further discussion.

## *Chapter* XIII

# SEX LIFE[1]

IN SPITE of the widespread interest and instruction in sexual matters, psychiatrists, teachers, and physicians continue to encounter pathetic and tragic examples of ignorance and misinformation on this subject. It even seems that the educational procedures, the flood of "sex books" on the market, and our much-vaunted "free discussion" have hardly decreased the prevalence of erroneous and harmful information.

Investigation and study have thrown new light on this old subject. People have discarded traditional attitudes and ideas on sex and have embraced new ones. Modern youth is making dogma of sexual freedom, just as their Victorian parents made dogma of convention, secrecy, and restriction. But now the new ideas seem to be causing as many and as severe problems as the old. And there is evidence of a swing back toward more strict rules of conduct for both sexes. The reasons for this are obscure, but probably are to be found in the psychological aspects of the sex instinct.

One has only to look at the sexual customs of primitive societies to realize that the sexual instinct may function successfully and happily under a great variety of practices. It would seem

[1] Prepared in collaboration with Dr. Ruth E. Boynton, Director, and Dr. E. M. deBerry, formerly psychiatrist of the Students' Health Service, University of Minnesota.

that almost any pattern will do, provided it is accepted by the individual and by the group in which he lives. But in no society at any time do we find that man has regarded sex as a simple physiological necessity. He has always made it mean more to him than this. Modern teaching seems to run counter to this tendency, for we are told again and again that we should regard sex as a simple biological function, that we should strip it of all taboos, sentimentality, and mystery. But nobody has yet succeeded in doing this.

We have discovered a great many things about the mental side of sex, but as yet we have not been able to understand it completely. It is safe to say, however, that any system of behavior will be sounder and healthier if it is built upon an understanding of its physical aspects. In no other body function is information about physiology so important as it is in this field. Generally speaking, a person may be completely misinformed about the mechanism of the heartbeat, of respiration, or of digestion without in any way disturbing the functions involved. It is quite otherwise in sexual matters, in which erroneous ideas may cause as much difficulty as actual disease. For this reason menstruation, nocturnal emissions, masturbation, marital relations, and sex relations outside marriage will be discussed briefly in the following pages.

## The Physiology of Sex

The sex organs of the male and female complement each other for the realization of nature's greatest purpose—the perpetuation of the species. In animals this is purely a physiological process, but civilized man encompasses his sex life with the tenderest of emotions and builds upon it love, home, family, and many other of the finest things in life.

The reproductive cells of the male, called "sperm," are produced in the testis, stored in the epididymis, and discharged through the ductus deferens and urethra. The penis is the male sex organ which carries the urethra, a tube for the emptying of the urinary bladder and for the discharge of the fluid, called "semen," from the sex glands. The penis is composed largely

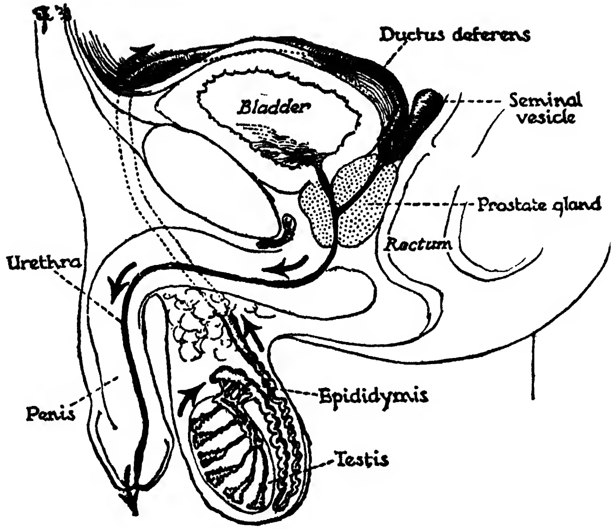


FIG. 9. MALE REPRODUCTIVE SYSTEM. Arrows indicate route of spermatozoa.

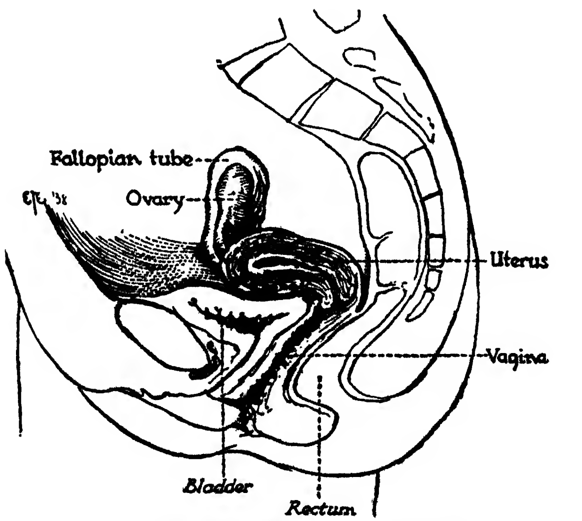


FIG. 10. FEMALE REPRODUCTIVE SYSTEM.

of blood vessels which become engorged during sexual excitation, causing the penis to become firm and enlarged.

The reproductive cells of the female are produced in the ovaries and are called "ova." One ovum matures each month and as it attains full size bursts forth from the surface of the ovary. This process is called "ovulation" and occurs approximately midway between menstrual periods. Upon leaving the ovary, one of which is located on each side of the pelvis, the ovum is free in the abdominal cavity. Very soon, however, it is drawn into the funnellike end of the oviduct (also called "fallopian tube" or "uterine tube"). It then passes downward into the cavity of the uterus, a muscular organ about the size and shape of a pear located in the center of the pelvis. In a day or two, if conception does not occur, the ovum loses its viability. The lower end of the cavity of the uterus, called the "cervix," protrudes into the upper end of a tubelike structure called the "vagina," which extends downward to the surface of the body.

During sexual intercourse the penis is inserted into the vagina and the semen discharged in the vicinity of the cervix. The sperm cells, which have the power of independent motion, then work their way up through the cervix and to the body of the uterus. If a sperm cell meets an ovum, fusion takes place and a new life is begun.

## Menstruation

The onset of menstruation is a sign that a girl is sexually mature and that reproduction is possible. Once each montn, the lining of the uterus, called the "endometrium," becomes thickened in preparation for the reception of a fertilized ovum. When fertilization does not take place, this thickened lining sloughs off and is discharged with some bleeding, which we speak of as "menstruation." This cycle is controlled by the internal secretions of several of the endocrine glands.

The usual age of onset of the menstrual periods is between twelve and fourteen years, although the periods may begin as early as ten years of age or as late as sixteen or eighteen. A girl

should be told about menstruation so that the occurrence of the first period will not be unexpected and frightening.

Since menstruation is a normal process, one should expect but little inconvenience from it, and it actually does occur in about 85 per cent of girls without discomfort or pain. Unfortunately many mothers refer to the menstrual period as the "monthly sickness." If girls are brought up with the idea that each menstrual period is a time when they should expect to feel ill, they are likely to become semi-invalids each month.

It is true that some girls do have severe pain at each menstrual period. When this occurs, adequate medical advice should be sought. The girl whose general health and resistance are good is less apt to have painful periods than the girl who is greatly underweight or anemic.

The hygiene of menstruation should vary little, if at all, from one's usual routine. Except for strenuous exercise involving jumping, ordinary activity is beneficial at the menstrual period, for it increases circulation and prevents the congestion which is one of the causes of discomfort. For the normal healthy girl a mile walk on the first day of the period is of much more value than several hours in bed. Warm tub baths may be taken throughout the period as at any other time. Excessively hot or cold baths are not advised.

The aim of every mother should be to have her daughter intelligently informed about menstruation by the time she is eleven or twelve years old and through her own attitude toward this periodic natural process help the girl to live as normally as possible during these periods.

## Nocturnal Emissions

Nocturnal emissions are an expression of development of the testicles and the accessory male organs of reproduction. Their occurrence is normal and should be regarded as such by both the boy and his parents. They may begin as early as the ninth or tenth year or as late as the sixteenth or seventeenth year. The age of onset appears to be without significance and to bear no relationship to the development of secondary sexual charac-

teristics, such as growth of beard. In healthy boys their occurrence may be nightly for periods or not more frequently than once a month. Regularity or irregularity seems to have no significance, and no effort should be made to control it.

Much misconception exists about the meaning of nocturnal emissions. It is often stated or implied that they represent wasted energy and that their frequent occurrence results in loss of vigor. This is entirely erroneous, for the semen which is lost represents nothing which could be used by the body for other purposes. It is a secretion of several glands, which will be discharged in one way or another, regardless of the efforts of the individual to retain it. The supposed relation to general health probably is due to a confusion of this with the internal secretion of the testicles. The latter does affect growth and metabolism, but it comes from a different source and has nothing to do with the semen.

A boy should be prepared by his parents, or some other adult, for this occurrence by an explanation of its source, its nature, and its harmlessness. Unless interfered with by a severe emotional blocking, it will occur normally at more or less frequent intervals; but to regard it as dangerous may give rise to a sense of uneasiness and insecurity. Generally speaking, if the attitude of the parents is healthy, the child will ask questions about sexual matters, thereby presenting an opportunity to explain as much as seems necessary. It is unwise to make an occasion of this explanation or to force it on the child when he is indifferent.

## Masturbation

Masturbation[2] is said to be an almost universal practice among healthy boys and common among girls. It may begin at almost any age and has been reported in children under three. Generally it is continued throughout adolescence, and occasionally into adult life, without any evidence of its being injurious. About 92 per cent of male college students admit mas-

[2] Self-stimulation of one's own sex organs, not "self-pollution" as given in some dictionaries.

turbation, with the practice seemingly most common among healthy and robust athletes. In more studious but physically less well developed types it may occur frequently or only at rare intervals.

Physically the habit as ordinarily practiced seems to be perfectly harmless and, unless it is regarded as dangerous by the individual, it gives no trouble. On the other hand, if a boy is taught or learns from reading out-of-date literature on the subject that masturbation causes a multitude of ills, that it undermines physical and mental powers, destroys the will, and weakens or destroys the sex powers, leads to insanity and other frightful consequences, he often develops a severe emotional conflict, which may make him asocial and self-conscious. The feeling of inadequacy which arises from this may affect injuriously his relations with other people and may decrease his efficiency in any work which he undertakes. It is important, therefore, that adolescent boys learn that masturbation is practically universal, and that, as far as we know, it is a harmless practice.

The boy who tries to inhibit this practice because he thinks it will do him harm fails in his good resolutions; whereas, if he knows that it is harmless, he usually masturbates infrequently and without emotional conflict. It is always dangerous to warn boys against masturbation, even if the warning is a mild one, for they are apt to infer more than is said to them and to attribute to it all of their little failures and inadequacies until it becomes a really serious problem.

Among girls not only is this practice less frequent than among boys, but conflicts over it are less common and less likely to cause serious disturbances.

It is important to realize, however, that masturbation is not a desirable or adequate form of sex expression. In youth there is always a tendency to excess which may lead to the expenditure of energy on masturbation during the years that nature needs all her resources for building manhood and womanhood. Furthermore, in the presence of prevailing social and religious taboos the practice tends to psychic disturbances, con-

flicts, and the development of inferiority feelings which may have serious effects upon the growing personality.

## Sex Emotion

With the beginning of adolescence new and powerful forces enter in to complicate the individual and social problems that grow out of sex. There comes a gradual awakening to sex consciousness—the awareness of sex. This awakening brings a psychic urge toward the opposite sex. This psychic urge is powerfully reinforced by a physiologic urge arising from the hormone activity of the sex glands. These inner factors of sex attraction together with the powerful and varied sex stimuli create for the adolescent youth a difficult problem of self-control. With the growth of the love-life in early adolescence there arises a new sex curiosity—curiosity about sex experience. This curiosity is natural and normal but obviously fraught with danger. . . . Adolescent curiosity calls for personal experience. It is largely this natural curiosity about sex experience that renders the lure of easily accessible prostitution in a community dangerous. A study of those who went in and out of a red-light district in a city a few years ago showed that a large proportion were boys of fourteen and fifteen years. Undoubtedly the lure of curiosity more than physiologic urge was the important factor.

With the arrival of sexual maturity in puberty the individual experiences the urge to sex satisfaction. The normal satisfaction of that urge is attained in sex intercourse with a member of the other sex. In civilized society today this recurrent sex urge cannot be satisfied in sex relations with the opposite sex with social approval, for good and weighty reasons which have grown out of the accumulated experience of the human race. Early marriage is not usually feasible because of the years needed for schooling and preparing to bear the economic and social responsibilities of life. Even when physical and mental maturity is reached, in the early twenties, which would seem to be nature's indication that the individual is fitted for the responsibilities of mating and rearing a family, more years must be spent by many in further preparation for vocation and life, and marriage postponed. So, between sexual maturity and marriage in which the sex impulse may find normal satisfaction with social approval there is often a gap of eight to fifteen years. This situation creates sex problems of greater or lesser severity according to the individual and his training. This period is really one of biological abnormality. Whatever the answer may be, we must acknowledge the problem.

Insofar as this situation becomes a problem, every boy and girl and man and woman must face it, not to quarrel with it but to handle it intelligently and constructively. The essential question for each is, how shall I deal with the problem so as to keep it within bounds, so that my sex nature may contribute most to my ultimate happiness and welfare, and so that I may play fair with the society of which I am a part? No one need expect to escape all conflict and

struggle in this sphere any more than in any other aspect of life, for conflict and the overcoming of resistance is in the essence of all life that is effective, and in this as in other areas one must not lose sight of the fact that it is not merely immediate but ultimate satisfactions that count.

At the outset youth needs to be aided to appreciate the fact that the years of deferred full sex satisfaction that civilized society imposes are by no means wholly a misfortune. They have brought tremendous compensations in that they have enabled us to reach a far higher type and level of love-life and sex-social relations than is possible on the primitive savage level. In savage life sex relations are mainly on the physical plane. They become the periodic gratification of a routine want like eating and drinking. The tender emotions component and the esthetic component of human sexuality which have so greatly enhanced, expanded and energized the love-life of human beings and largely woven the fabric of organized society are only rudimentary on the savage level.

In civilized life sex relations have risen to a vastly higher level. They have been given psychic and spiritual meaning and have been invested extensively with elements of beauty. Sex activity has taken on the service of love. It has become at its best the supreme love expression.

These psychic, esthetic and social qualities upon which enduringly happy marriage so largely depends do not come to us full-fledged in the early years of youth. They require time for growth and maturing. In the opportunity for their cultivation and the consequent enrichment of the love-life lies the compensation for such struggle as any deferring of physical sex relations during the years of youth may entail. In such cultivation lies the greatest assurance of achieving that kind and quality of married relationship to which we all aspire and as yet so few achieve. The refinements of civilization are bought at a price. In the sphere of sexual love at least the price is not too great to pay.

In relation to the sex ethics of youth it is important to bear in mind that the sex instinct is one of the most sensitive aspects of human personality and is extremely easily "conditioned" to certain lines of response. It becomes most easily bent to, and fixed in, a given line of reaction and behavior, and the attitudes and behavior patterns to which it becomes conditioned are tremendously significant in relation to marriage. An endless number of marriages become wrecked or move on low levels because adverse attitudes, ideals and habits acquired in youth have prevailed in marriage. This is one of the most frequent results from relations with prostitutes.

In a regimen for the wise handling of the sex problem the question as to the degree of physical intimacy a youth may wisely permit himself in his relations with the opposite sex arises. This raises the whole thorny question of petting. The impulse to indulge freely in physical intimacies is natural and it is strong in most of us. If the keen immediate pleasures which petting affords are to be limited or foregone, it must be for weighty reasons.

It may be readily admitted that a certain freedom in friendships and courtships is not only permissible but desirable, a freedom that is consistent with self-respect, with full respect for your partner and with the health and welfare of both parties concerned. We need, however, to face honestly certain facts which suggest limitations.

In the first place, the very nature of the sex impulse and the requirements of our social organization make rather definite limitations advisable. The sex impulse is a powerful and imperious force over which, beyond certain limits, we do not have full control. It easily becomes a tyrant. Give it an inch and it will take much more. Under the sway of these forces aroused in petting, especially of the heavier sort, judgment and control take wing and passion prevails. This is particularly true in men, in whom specific sex desire is naturally more easily and quickly aroused than in most women. For both young men and young women, however, indulgence in the more intimate forms of petting is for the most part playing with fire. However sincerely the petters may purpose to keep the indulgence within safe limits, nature has largely stacked the cards against them.

In the second place, petting is biologically and emotionally an abnormal experience. The intimacies of petting constitute the natural and proper approach to sex intercourse. . . . In petting the frequent arousal of the passions without their normal release tends to become physically and emotionally harmful. This is particularly true in women. The extent to which it may give rise to organic disease and functional disorders is becoming recognized and given attention by the medical profession.

In the third place, petting is frequently unfortunate in that it tends to exaggerate and overvalue the physical responses in relationships between the sexes. Enduringly happy marriage depends upon harmony between the whole of the two personalities—the physical, mental, emotional, temperamental, esthetic and social sides—and not upon passionate powers alone. Petting tends so to overemphasize and overvalue the physical side of the relationship as to warp the individual's judgment and experience and bring him to marriage ill-equipped to achieve the broader, richer basis of companionship which permanently happy marriage demands. The warped marriage ideal which he has acquired, the confusing of the limited, partial satisfactions of petting with the larger, richer satisfactions of the marriage relation at its best, often spell failure in marriage when it comes.[3]

## Sexual Promiscuity

Recent ideas about freedom in sexual matters have given rise to the belief in some places that sexual promiscuity is a harmless pleasure. The advocates of this new freedom generally hold that

[3] Quoted by permission from Exner, M. J., and W. F. Snow, "Sex Hygiene," The Practitioner's Library of Medicine and Surgery, vol. 12, "Hygiene and Preventive Medicine," pp. 149–155, Appleton-Century-Crofts, Inc., New York, 1937.

sexual instinct is a natural force which should not be unnaturally dammed up by continence and that inhibition may give rise to neurotic tendencies. This theory is not without basis, for undoubtedly certain neuroses and other personality maladjustments do result from the repression of sex. On the other hand, psychological repression and conscious control of one's actions are quite different.

Repression implies not only a refraining from sexual activity but also a refusal to recognize the existence of sexual desire, while conscious control admits the tendency but makes a conscious choice to refrain. In the case of repression the refusal to recognize the desire may lead to unhealthy emotional reactions. But promiscuous sexual intercourse is not a satisfactory solution even for inhibited people. On the contrary, it usually gives rise to a host of psychological difficulties, even in those who think that they are free from moral taboos, and who have taken the necessary precautions against illegitimate pregnancies and venereal disease.

For this reason, we cannot justify current belief that promiscuity and free premarital relations are "healthy and natural." The emotional and psychic elements in sex are of far greater importance than its physical aspects; and as yet there is much that we do not know about these psychic results. So the wisest course for one to pursue is to avoid illicit sexual intercourse but at the same time to recognize the desire which one intends ultimately to satisfy. In this way one may avoid the danger incident to inhibition and repression, on the one hand, and the emotional conflicts which may arise from indulgence, on the other. The belief, occasionally found even among physicians, that continence is physically dangerous is unfounded.

Two distinguished writers, one a woman and the other a man, recently made such significant statements concerning chastity that we requested and were granted permission to reproduce excerpts from them here. The first is by Margaret Culkin Banning, who says:

> If there is a case for chastity, it should be stated. Religion and obedience to moral codes still settle the question for many. But the increasing secularization of thought and the frequent denial that any moral issue is involved in sex con-

duct leaves uncounted thousands of young people today supposedly free to "make up their own minds," if such a phrase can be used concerning conduct which is nearly always the result of runaway emotion. . . .

We know that there are 50,000 unmarried mothers registered yearly in the United States; that through wealth and influence many unmarried mothers are not registered; that many couples marry after pregnancy is discovered; and that birth control and abortions prevent motherhood in most illicit affairs.

Nevertheless, we must remember that unchastity, common though it may be, is not the norm. That still is chastity. Society does not approve nor is it set up for the general practice of unchastity. Every adult must know, as I do, many young girls who are not troubled by this problem, and others whose lives offer no opportunity for it. They keep regular hours. They are preoccupied with study, sports, domestic tasks and wholesome social activities. . . .

Dangers—disease, abortion, emotional disasters, and even death—surround every premaritial relation. But many people run the risks and escape. If the girl does escape, is there still no case for chastity?

Each girl's chastity is the interweaving of her moral code, her nervous system, her physical being, and her mind. Does she realize how profoundly that interwoven fabric may be altered in a few yielding moments?

In the breaking down of chastity, her moral code is often violated. True, she may think she has none. Yet the great weight of tradition and poetry and romance is pressing on her, even if she is without a belief in orthodox religion. Hence many girls cannot but carry with them into early sexual experience a sense of sin which they never lose. This "guilt sense" is spoken of by almost all the doctors who have investigated such things. Even without a sense of actual sin against religion, the "guilt sense" persists in a large majority of cases. The girl who thus feels that she is doing wrong suffers shockingly. . . .

On the other hand, there are girls who have really cast off conventions—who feel no spiritual or moral connection with their sex conduct. How do they come out? Usually they are deserted. If a woman has this point of view, she almost always believes—and says so once too often—that she can look out for herself. In many cases that is what her lover ultimately allows her to do. And then she becomes an outlaw. Society provides no protection for her. She may have the bravado of the outlaw, but she also has his loneliness. . . .

Loudly as it may boast of its freedom, unchastity carries repression right along with it. There are places where it cannot go. The unchaste girl often lacks escort and open companionship. There are times when she may not speak to the one person she cares about. As long as passionate love or even excitement is growing and deeply shared, this may not matter. Secrecy is then a delicious privacy. But every recorded experience shows that such secrecy has the seeds of bitterness in it. The girl usually become resentful, hating to be hidden and unacknowledged, and yet more fearful of the discovery of her relation. If the adventure is, as it very well may be, casual in fact to the boy

in the case, who passes on to other conquests, the consequences to the girl can only be torments of jealousy, frustration and despair.

Such breaks and the resultant sense of inferiority and pain often make a woman promiscuous. . . . The promiscuous woman is usually in doubt of her own attractiveness and is seeking reassurance by repeated and varied experience with men. The fact of inferiority is also true of promiscuous men, who in such ways prove a virility which they secretly doubt. It is bad for a man who ultimately wants a happy home relation because he soon becomes neither romantic nor patient enough to give his wife satisfaction. Also, the promiscuous man or woman finds adjustment to monogamy almost impossible. An unchaste past is intrusive and a troublemaker. Sex loses charm, but the craving for satisfaction and the nervous search for it goes on. Promiscuity makes people lose the greatest experience in life—love. . . .

Finally, normal young men and women do not want unchastity. They are searching for an ethic to guide them. College investigations show that students believe in fidelity, want marriage. They want an emotional life with vitality in it, one that will wear. The case for chastity does not need much pleading before young people thus disposed. Given proper ideals, decent upbringing, half a chance, it is what girls and boys want.[4]

The second statement, which is supplementary to this, is by Donald Culross Peattie, who writes:

. . . Chastity *is* important, because it is right. And because it is beautiful, and something in which to take a pride such as nothing else can give you. . . .

I have three sons. . . . My ideal is to make my sons good lovers, for love and chastity are facets of the same stone. . . . I want my sons to be good lovers, because the lover is, voluntarily and naturally, chaste. It is a corollary, of course, to this proposition, that I want my sons to be chaste because I want them to be good lovers. For I honestly believe that chastity on both sides before marriage is worth far more than any advantages possessed by the previously experienced lover.

When I say I want my sons to be good lovers I do not mean skillful seducers, or perennial ladies' men. By good lovers I mean good husbands. And something better than settled, faithful, and patient husbands. Someone, in short, who can make love well enough to get his wife to feeling like the Duchess of Windsor just when she knows she must be looking like the Witch of Endor. Somebody who slips a loving hand just under the weight of her heart, and so makes it perpetually feel a little lighter than it really is. . . .

I hope that my boys fall genuinely in love early, and stay in love—the best protection for their chastity. I shall not pretend that it is an easy thing to

[4] Banning, Margaret Culkin, "The Case for Chastity," *The Reader's Digest,* vol. 31, p. 1, August, 1937.

keep. Few of the best things in life are come by easily. Most take years of self-discipline and application. It is precisely the element of the difficult about chastity that puts the high value on it, and I am counting on my children's understanding this, because they are not moral softies who give up if a thing requires any exertion. . . .

The sex instinct propels us to seek a mate; mating is its only aim, and everything connected with sex has no other meaning. But man, I am going on to say to my sons, is not a thoughtless beast. Man stands up and directs his destiny. He cannot, in most cases, permanently deny the sexual instinct, nor should he, but he can pick his time and his partner. And if he cannot even perform so agreeable a task as this decently, he has every reason to be ashamed of himself. For life, I am going to repeat often to my sons, is holy ground, and we should all walk here with some reverence, grateful for the short time that we are allotted to till that ground and, mastering it, make it bear us fruit.

And that fruit is our children. So that it matters to a man not only out of whose womb they are going to be born, but also what sort of a father gives his blood to their blood. It is hardly reasonable of a man who "tore around" nightly for 10 or 15 years before he settled down to marriage with a decent girl, to be astounded if he should have a daughter with morals no better than his own. It need not surprise him, if he once succumbed to a wishy-washy girl and had to marry her, if she gives him wishy-washy sons. Such sons and daughters come by their qualities quite honestly, and their parents cannot reproach them.

I shall remind my sons that each one of them is the converging point of a vast number of hereditary lines. When they choose a girl they choose more than an armful of sweetness. They choose her family, living and all the way back.

And they are making this fateful choice, for all they know, when they are not proposing marriage at all but just trying a little experiment. Almost parenthetically, because I expect my children to be as sensible and decent as most young people, I shall remark that it is playing with fire to start intimacies; for after a certain point there is no turning back, and that point is reached far sooner than expected due to the fact that in sex pleasure-hunting one has always to go a little farther than the last time to revive the original thrill. I shall point out that the "easy girl" has lost the habit of faithfulness and never acquired the habits of wifely love. And the young man who doffs his chastity with a scornful laugh for it may not find that light and shining garment again.

I do not mean that one misstep must damn soul or body; I would certainly not want my boys to think that their parents would not forgive anything and try to understand. But missteps in love are steps going down, and everybody knows it in his heart. They lead down into bitter regrets that don't mend the situation, into shuddering revulsion that the chaste lover never has to know, into a hardening of the spiritual arteries, a relentless soul-coarsening. It is

possible, for a very strong and determined spirit, to climb back up those steps again and scrape himself clean. But strong and determined souls are not, usually, the ones who can be persuaded to descend in the first place. They are the ones who have generally kept their chastity. And while it is kept, the rapture and the pride of sex remain enthroned.[5]

## Homosexuality

Although homosexuality is a subject about which much has been written, it remains one of the least understood phenomena of psychopathology. It is discussed by "intellectuals" everywhere and is generally considered a reliable subject for interesting conversation and speculation. A surprising number of college and high school students have read Krafft-Ebing and Havelock Ellis on the subject, and most of them are ready to express opinions about it. Unfortunately, this reading and discussion have not resulted in enlightenment. Instead, in many cases they have led to confusion and misinterpretation which, when applied personally, have prepared the young man or woman for the adoption of homosexual practices.

Early investigations either implied or stated explicitly that homosexuality was ingrained in the individual as a manifestation of structural peculiarity. Although this cannot be denied as a possibility, it can be shown that there is little evidence to support it. Structurally, anatomically, the homosexual does not differ from the heterosexual, and some homosexuals are cured of their homosexuality. Like other mental and emotional derangements it is probably a learned reaction and as such should be subject to reeducation. Whatever the deep sources of such behavior may be, the frequently expressed opinion that it is innate and unchangeable can do nothing but harm, since it closes the subject to further investigation and attempt at therapy.

It should be remembered that occasional homoerotic practices occur in the lives of most normal adolescents, probably as an expression of a stage in sexual development. Such passing episodes should not be occasion for alarm. Their danger lies in

[5] Peattie, Donald Culross, "A Way to Chastity," *The Reader's Digest*, vol. 31, p. 80, December, 1937.

their interpretation as expressions of deep pathology or innate peculiarity.

## Marital Relations

Marriage and the family always have been and doubtless always will be the foundation of society among civilized people. Even Soviet Russia, which proposes to substitute the state for the family, still recognizes marriage.

The basic emotion which brings a man and a woman together in marriage is sex; and compatibility in this regard is one of the requisites for a happy marriage. In fact, sexual satisfaction for both partners in marriage is almost essential for happy married life.

In spite of the importance of the sexual aspects of marriage, there is so much variation between individuals in the matter of psychosexual constitution that it is difficult to give general advice on the subject. When an individual has difficulty with sexual relations in marriage, it usually is due not to ignorance on the subject but to complicated emotional attitudes, the correction of which necessitates far more information than it would be possible to obtain from a general discussion of the subject. In individual cases of maladjustment, therefore, it is wiser to consult a psychiatrist than to seek aid from books that have been published on the subject.

In very large measure the problems of sex adjustment which lead to maladjustment and failure arise out of the natural differences in the sexual constitutions of men and women. Even at best, when understood, these differences of themselves present more or less formidable adjustment problems. Both with a sympathetic understanding of the natural sex differences there is large hope and prospect for making the adjustments successfully. It is the widely prevailing ignorance of, and misconception about, the differences in sexual make-up of men and women and, hence, the failure to take them into account that has caused such frightful mismanagement of sex relations and such widespread tragic consequences. . . .

Briefly stated, we may say that in men sex desire is fairly uniform, they do not vary as widely in regard to it as women do; in men sex desire lies close to the surface and is easily aroused and quickly satisfied, and man is always liable to sex desire in all its forms. In women sex desire varies much more widely, the extremes are farther apart; it lies deeper, and is more slowly aroused and more

slowly satisfied; it is subject in most women to tidal rhythm related to ovulation and menstruation; and it is subject to development to full power gradually through experience.[6]

Knowledge of sound contraceptive methods is a part of the equipment for the intelligent approach to marriage. This is now widely recognized and such information is available to those who seek it. Birth control is practiced as a result of a desire on the part of people to have the size of family they want and when they want it. Religious groups which condemn artificial methods recommend the so-called "safe period." Many people believe that the practice of contraception is harmful to the individual, but this is untrue, if proper contraceptives are used. On the other hand, practices which cause stimulation without complete satisfaction are to be comdemned.

## Venereal Diseases

The term "venereal," derived from Venus, the Roman goddess of love, is applied to those diseases which are contracted primarily through sexual relationship. Syphilis and gonorrhea are the two important diseases included under this term, although there are several others such as chancroid, lymphogranuloma inguinale, and venereal warts, which belong in the same general group. Both syphilis and gonorrhea have caused untold illnesses and deaths for hundreds of years; but only recently has it been possible to write about them in the public press, and even yet certain radio stations bar mention of them over the air.

*Syphilis*, sometimes called the "pox" or "lues," is caused by a living organism called the *Treponema pallidum* or the "spirochete" of syphilis. Infection is usually acquired through sexual intercourse or congenitally from one's parents, although at certain stages it is transmissible through kissing or by contact with objects recently contaminated with discharges from

[6] Exner, M. J., and W. F. Snow, "Sex Hygiene," The Practitioner's Library of Medicine and Surgery, vol. 12, "Hygiene and Preventive Medicine," p. 157, Appleton-Century-Crofts, Inc., New York, 1937.

See supplementary reading list for reference to books and pamphlets which contain much excellent and sane information concerning sex relationships in marriage.

an infected person. Common drinking cups and towels have been found to transmit the infection, but fortunately the germ of syphilis is killed very quickly outside the body by drying, sunlight, or soap and water. Consequently, ordinary measures of sanitation and personal hygiene are adequate protection against the indirect transmission of syphilis.

Just how prevalent syphilis is no one knows. Conservative estimates are that 2 to 5 per cent of the people in this country are infected. Among some groups the percentage is lower than this and among others, particularly those who might be considered on the fringe of society, such as criminals, prostitutes, and drifters, it is certainly much higher. In a series of 19,000 Wassermann tests performed as part of the routine physical examinations of University of Minnesota students, 39 cases of syphilis were found—one-fifth of 1 per cent. One might well ask whether the use of this test is justified when it leads to the discovery of so few cases. From a statistical point of view this might seem doubtful, but a consideration of the individuals involved can leave no doubt concerning its value. The infections of some of these students were acquired; others were congenital. None of the 39 was under treatment, although in practically all cases the disease was still curable. Untreated, many of these young men and women would have had in store for them years of invalidism and early death.

A few years ago two physicians from Indianapolis reported that by the routine use of the Wassermann test they discovered syphilis in between 2 and 3 per cent of presumably healthy men and women who came to them for physical examinations. These patients were about equally divided between those who would be called well-to-do and those in moderate circumstances. Such information leaves no doubt as to whether this test for syphilis ought to be included in every physical examination. Several states now have laws which require a Wassermann test of everyone who applies for a marriage certificate.

The first stage of syphilis, called a "chancre," is a local sore, relatively painless, at the point of infection. This usually appears from twelve to forty days after exposure. It may be an ulcer

of considerable size or merely a small blister or pimple or red spot which may be entirely unnoticed. This latter is particularly true in women. In a chancre the spirochete of syphilis can be detected by microscopic examination. At this stage the disease is highly communicable.

The Wassermann test is a test of the blood to determine whether it contains antibodies against syphilis. Antibodies develop only as a result of infection; so a positive test indicates, except for certain inaccuracies, existing syphilitic infection. Since it takes some time for antibodies to develop, this test usually does not become positive until about the third or fourth week after infection. It then tends to remain positive as long as infection exists except in some of the late degenerative stages of the disease. If treatment is started before the Wassermann test becomes positive, approximately 90 per cent of those treated can be cured. After the blood test has become positive, the chance of cure is reduced to 64 per cent. The disappearance of the chancre, which occurs in a short time with or without treatment, is frequently mistaken by the patient for the end of the disease.

Although syphilis is a continuously progressive disease, it frequently is spoken of as manifesting itself in three or four stages, the second of which is characterized by a skin eruption which may resemble measles or chicken pox and by sores in the mouth and throat. At this stage the patient may infect others through kissing. These secondary manifestations are often so mild and inconspicuous as to escape notice. Like the chancre, they too disappear after a time without treatment.

The late stages of syphilis which follow in two to twenty or more years are the degenerative effects of the disease upon the heart, blood vessels, brain, spinal cord, or other tissues or organs of the body. At this stage adequate treatment will still arrest the disease in approximately half the patients, but the damage which has been done cannot be repaired.

Syphilis is one of the diseases over which we could have complete control. We know its cause and how it is transmitted. We have a simple test to aid in its diagnosis, and we have an effective

cure. Scientifically, nothing more could be desired. Yet this disease will continue to be a major cause of illness and disability until the public and the medical profession make more intelligent application of the control measures which science has made available to us.

*Gonorrhea* is another venereal disease caused by a specific germ. It has no relationship to syphilis, although both are acquired in the same way and may be contracted at the same time. Like syphilis, gonorrhea is usually contracted through sexual intercourse with a person who has the disease, although it may be transmitted by towels or toilet articles used by infected persons. If a mother has gonorrhea when her baby is born, its eyes frequently become infected and blindness may result unless proper preventive treatment is utilized. Female children are not infrequently victims of a gonorrheal infection as a result of coming in contact with the infective discharges of an infected parent or other person.

Gonorrhea is several times as prevalent as syphilis; in fact, it is estimated that there are more than a million new cases of gonorrhea in this country each year. Although gonorrhea is frequently considered as insignificant, in the aggregate it is responsible for an enormous amount of disability and invalidism.

The gonorrhea germ, called the "gonococcus," sets up a purulent infection of the mucous membranes of the genital organs. This causes a yellowish, purulent discharge from the genital organs. After several weeks this discharge stops, even without treatment, but the bacteria continue to live in the deeper parts of the reproductive tract. In the male an abscess may develop later in the prostate gland and the germs may be discharged during sexual intercourse, even though no symptoms have been present for some time. In the female the gonococci travel up the genital tract into the pelvis and frequently cause chronic and serious infections. In fact, gonorrhea is the most common cause of sterility and pelvic operations in women.

Gonorrhea responds well to treatment with the sulfonamides and penicillin but such treatment needs to be administered under competent medical supervision. Self-treatment or the ministra-

tions of the quacks and fakers who promise quick and cheap cures merely lead to serious complications.

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# Chapter XIV

# PARENTHOOD[1]

IMPROVEMENT in obstetrical and infant care and the resultant decrease in the terrific death rates of mothers and infants are among the achievements to which modern civilization can point with greatest pride. Yet there are still far too many deaths—unnecessary deaths—among both mothers and infants, occurring in our own country today.

## The Course of Pregnancy

Conception takes place and pregnancy begins when the male reproductive cell, called the "sperm," finds and unites with the reproductive cell of the female, called the "ovum." This union normally occurs in one of the ducts or canals, called "fallopian tubes," which conduct the ova from the ovaries to the uterus, or womb. First there is a single new cell, then as development begins two, then four, then eight, and so on. Next, cells differentiate into different tissues and organs with growth proceeding at an enormous rate. The relative rate of growth is never again so rapid as during these early months of beginning life, yet it is not until approximately four months after conception that it is possible to make a positive diagnosis of pregnancy by the ordinary examination. Two to three months earlier than this, however, an

[1] Prepared in collaboration with Dr. Ruth E. Boynton, director of the Students' Health Service, University of Minnesota.

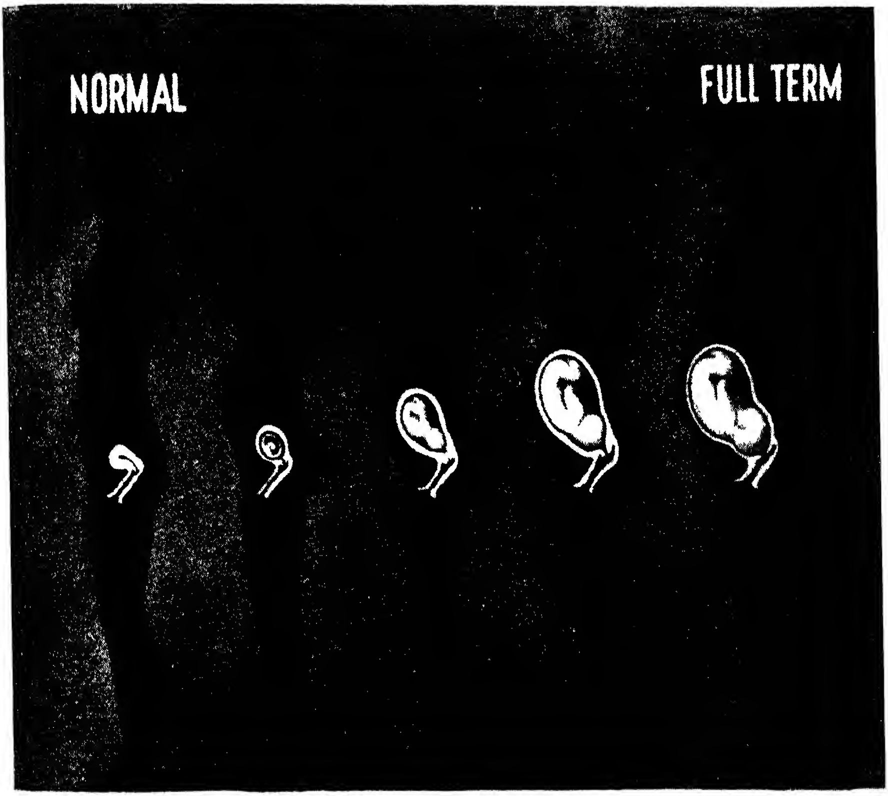


FIG. 11. BODILY CHANGES IN PREGNANCY.

almost positive diagnosis of pregnancy can be made by means of a special hormone test; and there are the well-known suggestive signs of pregnancy such as cessation of the menses, morning sickness, breast changes, and enlargement of the abdomen. The average duration of pregnancy is 280 days —9 calendar months or 10 lunar months— but there is no reliable means of estimating the exact date of the baby's arrival.

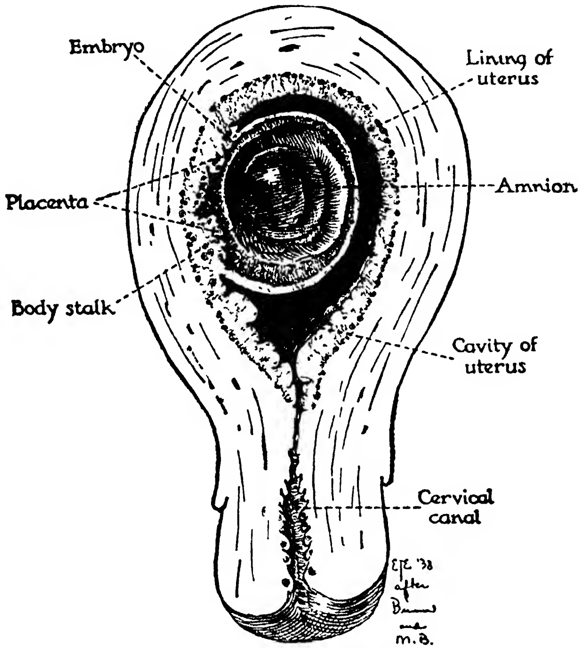


FIG. 12. UTERUS ABOUT ONE MONTH PREGNANT.

## PRENATAL CARE

As soon as a woman suspects the possibility of pregnancy, she should consult her doctor, not only to be assured of her condition but also to provide proper care for herself and for her developing child. It is true that childbearing is a natural process, but it is one which may very quickly become seriously abnormal. It is only by adequate medical care during pregnancy that the health of mother and child can be safeguarded. Every woman should have a complete and thorough examination at the begin-

ning of pregnancy and a subsequent examination by her physician at least once a month during the first 6 months of pregnancy, and then every 2 weeks or oftener until delivery. Supervision of the pregnant woman, once she has placed herself under a physician's care, naturally is his responsibility, but it is up to her to put herself under his care at the beginning of pregnancy and to cooperate by following his advice and instructions thereafter.

Every pregnant woman and her husband should inform themselves concerning the physiologic changes which occur during pregnancy, labor, and the post-partum period. This information may be obtained from authoritative books on the subject, or from bulletins of the U.S. Children's Bureau or the State Health Department. They should also know the most important signs and symptoms of the possible complications of pregnancy, such as persistent headache, recurring vomiting, dizziness, disturbances of vision, swelling of the hands, face, or ankles, severe pain in the abdomen, vaginal bleeding, acute illnesses, obstinate constipation, and marked shortness of breath, and should report the appearance of any of these promptly to their physician.

## THE HAZARDS OF PREGNANCY

During 1947 there were reported in the United States 4,978 deaths related to childbearing. This is a record of which we certainly cannot be proud. It is encouraging, however, to note that this represents a decline of 67 per cent from the rate which existed in 1930, when there were 14,836 maternal deaths reported. An intensive 3-year study of the causes of maternal death in New York City concluded that 66 per cent of the women who died might have been saved if they had had proper treatment and care. The general causes for inadequate care may be grouped under three headings: poverty, ignorance, and inadequate or incompetent professional service during pregnancy and delivery.

Some of the accidents and serious hemorrhages of childbirth are unavoidable, but competent professional attention will prevent most of them. Infection in connection with childbirth, called puerperal sepsis, is practically all preventable. In 1843

Oliver Wendell Holmes, physician and author, declared in a paper entitled "The Contagiousness of Puerperal Fever" that physicians, nurses, and midwives were responsible for most of the infections which occur during childbirth.

The toxemias, or poisonings, of pregnancy, which cause damage to the liver and kidneys and may result in high blood pressure, vomiting, convulsions, and death, can be recognized in their incipiency and usually can be successfully combated by the program of prenatal care which has been outlined.

The Chicago Maternity Center reports a maternal mortality of less than one-fourth the rate for the country as a whole, and its clients are among Chicago's poorest mothers. In Cattaraugus County, New York, mothers receiving prenatal care have a death rate of 12 per 10,000 live births as compared to 38 for the nation as a whole.

## PLACE OF DELIVERY

An increasing number of mothers are going to hospitals for delivery of their babies. Obviously there are definite advantages in the better facilities of the hospital delivery room, particularly if some unforseen abnormalities or accidents should occur. On the other hand, hospital care increases the expense and unfortunately, in many hospitals, the danger of infection during delivery is greater than in the home. Instructions in regard to proper preparation for delivery in the home may be obtained from private physicians, public health nurses, or state and local health departments.

## PROFESSIONAL CARE DURING DELIVERY

The U.S. Children's Bureau, as a result of a study of maternal mortality in fifteen states, reported that 83 per cent of the women were attended by physicians, 11 per cent by midwives, and 4 per cent by other nonmedical attendants; 2 per cent had no attendant at the delivery. Without question the most competent service at a delivery can be expected from a physician adequately trained and experienced in obstetrics. Physicians in general practice are trained also to conduct normal and certain

of the less seriously abnormal deliveries. Realizing their limitations to deal with some of the rarer and more serious complications, they are quick to call for whatever consultation is in the interest of the patient. Midwives in certain foreign countries are reasonably well trained to render obstetrical service in normal deliveries, but the vast majority of the midwives practicing in this country are old, careless, and dirty and have had little or no training. Exceptions to this are the trained nurse-midwives who are rendering splendid service in the mountains of Kentucky and in certain other sparsely settled regions where medical service is not available.

### NORMAL AND INSTRUMENTAL DELIVERY

The vast majority of deliveries will occur spontaneously and should be permitted to do so, because instrumental delivery increases the risk of infection, of hemorrhage, and of accidents to both mother and child. In probably not more than 5 per cent of deliveries is instrumental or operative interference really necessary. In the New York study the death rate from instrumental and operative deliveries was five times as high as that from spontaneous delivery. In this group of operative deliveries, of course, are included the seriously abnormal cases. On the other hand, this same study reports that 77 per cent of the deaths following operative delivery were judged avoidable, as compared to only 48 per cent of the deaths which followed spontaneous delivery.

Instrumental delivery is frequently a life-saving procedure for mother or child, but it is uniformly agreed by the specialists in this field that instruments are used far too often. For this physicians are themselves in part to blame, but some of the responsibility must also be laid at the door of the patients who insist upon instrumentation to shorten labor.

*Cesarean section* is delivery of the child through an incision in the abdominal wall and in the uterus. There are many instances in which this operation has saved the lives of both mother and child, but, like instrumentation, it is an operation attended with greatly increased risk. Many of the Cesarean operations

could be avoided by proper medical care during the prenatal period.

### ANESTHESIA FOR LABOR

One of the greatest blessings that science has given to mankind is that of anesthesia. Dr. Crawford Long of Atlanta, Georgia, in 1844 was the first to use ether for anesthesia, but the real impetus for its use in surgery was given by Dr. W. G. T. Morton, who in 1846 demonstrated its effectiveness before a surgical clinic in the Massachusetts General Hospital. During the same year a Scottish physician, Dr. James Simpson, introduced anesthesia into the practice of obstetrics. For some time the relief of pain during childbirth was considered sacrilegious, but this opposition died down rapidly after Queen Victoria sanctioned its use on the occasion of the birth of Prince Leopold in 1853.

Today a woman has the right to expect some relief from the pain of childbirth, but no mother should demand relief at the risk of her own life or the life of the child. All substances which are used to produce anesthesia are toxic, and no single method or combination of methods is uniformly applicable. The time and degree of anesthesia must be determined by the physician and not decided on the basis of some magazine article on the subject.

### ABORTION

Abortion means the interruption of pregnancy before the child is sufficiently developed to be able to live outside the mother's body. Dr. Frederick J. Taussig, who has made a greater study of abortion than anyone else in this country, estimates that approximately 600,000 abortions occur yearly in the United States, and that 8,000 to 10,000 women lose their lives from this cause every year. Many of these deaths are reported as due to other causes and so do not show in the mortality statistics. Two-thirds of these abortions he estimates, are induced and one-third are spontaneous. The death rate following abortion is three times as high and the invalid rate ten to fifteen times as high as

following delivery of the child at term. The specific dangers of abortion are infection, subsequent sterility, and endocrine disturbances which may cause chronic invalidism.

Spontaneous abortion is a condition which needs careful medical study. Some cases are due to disease, such as syphilis, toxemia, and diabetes; some to deficiencies in the endocrine secretions related to pregnancy; some to deficiency of vitamin E; some to weakness inherent in the germ plasm of the sperm or ovum; and some to physical abnormalities of the pelvic organs. Obviously, most of these are preventable.

Induced abortion carries a terrific hazard to both life and health. During the period 1930 to 1935, when the general maternal death rate declined 15 per cent, the death rate for abortions increased 25 per cent. Many of these are self-induced by methods which would make anyone who understands physiology and asepsis shudder. Others are performed as illegal operations by "doctors." Some of these abortionists are unethical physicians; others belong to some of the cults; and still others are not licensed as any type of practitioner. The major reasons for abortions are poverty, large families—and, of course, poverty is a factor here—illegitimacy, marital difficulties, and selfishness. Very rarely the physician will need to perform an abortion to save the mother's life, and there are situations in which the limitation of offspring is advisable. The only safe way to accomplish this, however, is not by abortion but by the practice of contraception or by sterilization.

## OBSTETRIC SUPERSTITIONS

There has long been a superstition that maternal impressions or emotional disturbances of the mother, such as anger, fright, grief, or horror, may cause her unborn child to be marked, injured, or deformed. Certain hereditary traits are transmissible from parents to offspring through the germ cells which unite to give rise to the new child; but after conception has once taken place, the mother's body merely provides warmth and nourishment for the baby until it has developed to a point that it is able to lead an independent existence. The only con-

nection between the mother and the baby is through the umbilical cord. This cord carries arteries and veins but no nerves, and even the blood of the mother does not mix with the blood of the child, the exchange of nutrients and excretory products taking place through a membrane which separates the two circulatory systems.

## Infant Care

Man achieves immortality largely through his children and his work. As soon as an infant has been born, its health and welfare become the first concern of both its father and its mother. This is one of the points of difference between man and most of the lower animals; and as culture and civilization advance, we find mankind attempting to provide better and better protection and educational and vocational opportunities for children. Sir Arthur Newsholme, leading English authority on public health, states: "Infant mortality is the most sensitive index of social welfare and of sanitary improvement which we possess. If babies were well-born and well cared for their mortality would be negligible." In some sections of the world the chances are not more than one in two that a newborn child will live to reach its first birthday, and in some cities of our own country within the present century approximately one child out of three died during the first year of life. In the registration area of the United States 162 infants per 1,000 born alive died during the first year of life in 1900; by 1930 this number had been reduced to 64.6; and by 1948 to 32.0. In 1928 to 1930 the corresponding rates for several other countries were as follows: Chile, 234; British India, 178; Ceylon, 175; Italy 125; Japan, 124; Germany, 96.4; France, 96; England, Scotland, and Wales, 63; Sweden, 58; Norway, 55; Switzerland, 51; and New Zealand, 35.

The major causes of infant mortality among the white population of this country at the present time are prenatal and natal diseases and injuries, respiratory diseases, and gastrointestinal diseases. The toxemias of pregnancy and syphilis are the primary causes of premature births. Adequate care during the prenatal period and modern hospital facilities for the care of

premature infants are effective measures in reducing these deaths. The same may be said concerning some of the respiratory diseases. Bronchitis, pneumonia, and other respiratory infections are serious in infants because they have little resistance against them. Hence, all infants should be safeguarded in every possible way from exposure to children and adults who may transmit colds or other infections to them. Malnutrition and the deficiency diseases lower the infant's resistance and so contribute to the seriousness of these respiratory infections.

The diarrheal or intestinal diseases long occupied first place among the causes of infant mortality and still do so in certain countries. The marked reduction in the deaths from these diseases which has taken place in this country has been due largely to sanitation and improved methods of infant feeding. Breast milk is the ideal food for a baby. Studies have shown that the death rate from intestinal diseases is three to ten times as high among artificially fed as among breast-fed children. The young women of today are physically superior to the women of previous generations and almost all of them are able to nurse their babies for at least the major part of the usual nursing period of nine months. Breast milk is desirable not only because it is easily digested and is most nutritious for the child, but also because it offers protection against diarrheal and intestinal diseases and increases resistance against measles, scarlet fever, and other common infections of infancy.

A few years ago a serious and frequently fatal blood disease of newborn infants was found to be caused by a certain incompatibility of the parents' blood. This is dependent upon what is known as the "Rh factor." Tests can be made for this condition. If it exists, the risk to the child can be reduced by careful medical supervision and care during pregnancy.

The more important indirect causes of infant death are poverty and ignorance. Many studies have shown a direct correlation between low income of the wage earner and high infant mortality. One of these studies reports 168 infant deaths per 1,000 live births among families with an annual income of $500 or less as compared to a rate of 30 per 1,000 among families with incomes

of $3,000 or more, and an increase of 20 per cent in the infant death rate in families of which the wage earner became unemployed during the depression years of 1929 to 1932.

The conditions of poverty are all adverse to the survival of the delicate life of the newborn infant. On the other hand, poverty, unemployment, and larger families than can possibly be supported are frequently the result of the same sort of ignorance and irresponsibility which contribute to a high infant death rate. It has also been shown that, by instruction of the mother concerning the proper care and feeding of infants, it is possible materially to improve nutritional status, even though the family's income be no more than relief allowance. The U.S. Children's Bureau in Washington and the state and local health departments make available bulletins of information, advice, and, if necessary, public health nursing service for maternal and infant care, so that there is no longer any justification for the ignorance and neglect which has been responsible for most of the deaths of mothers and infants in the past.

## Heredity

Heredity is the major determining factor in the sum total of the qualities, characteristics, and traits which have been transmitted from generation to generation through the ages past and will continue to be transmitted to future generations still unborn. It is common knowledge that children frequently resemble their parents. This is evidence of the hereditary transmission of certain physical characteristics. Many other less evident but much more important traits are inherited, and these may come not only from one's parents but also from one or more of one's four grandparents or one's eight great-grandparents or sixteen great-great-grandparents, and so on for generations.

Some inherited traits do not appear in every generation even though they are transmitted through these generations to their children or their children's children. Furthermore, hereditary traits transmitted from one parent may be submerged or modified by the inheritance of opposite traits from the other parent.

Human heredity is a complicated mosaic, but science has

begun to identify the elements in this picture and arrange the pieces so as to make for an increasing understanding of this all-important factor in our lives.

In sexual reproduction there is a union of the nucleus of the sperm with the nucleus of the ovum. In each of these nuclei are twenty-four minute structures known as "chromosomes." These chromosomes carry all the hereditary elements, called "genes," which are transmitted from parents to their children. The infinitesimal size of these genes can be appreciated from the fact that 100 million sperms may be contained in a single drop of seminal fluid. Upon the union of these reproductive cells the chromosomes from the two parents unite in the nucleus of the cell which represents the beginning of a new life. This fertilized cell, its nucleus and its chromosomes, then divide and redivide innumerable times as the new child is developing. In time these cells become specialized to form the various tissues and organs of the body, including the ovaries and testes. In these are developed and stored the chromosomes, with their genes, to pass along the accumulated hereditary traits to future generations. Nothing that happens in the life of either men or women alters the genes which their children receive. And it seems to be merely a matter of chance as to what proportions and combinations of these all-important genes are contained in an individual ovum or sperm. For this reason children of the same parents do not necessarily show identical hereditary patterns.

*Congenital Influences upon Health.* Hereditary influences, as we have seen, are transmitted through the reproductive cells. In addition to this a newborn child may be influenced to a certain degree by the condition of the mother during the nine months that the child is developing in the uterus. The child's nervous system and circulatory system are entirely separate from those of the mother but food and oxygen pass through the membranes which separate the blood of the child from that of the mother. In similar fashion certain poisons or infections may be transmitted from mother to child. Influences of this sort exert their effect upon the child after its development has started and are called "congenital" in contrast to those heredi-

tary influences which are inherent in the germ cells and transmitted from generation to generation.

*The Mendelian Law.* An Austrian monk, Gregor Mendel, was the first to demonstrate the specific operation of heredity. His experimental materials were two varieties of peas, one tall and one dwarf. He fertilized the blossoms of the tall variety with pollen from the dwarf variety. The seeds which developed from these cross-pollinated plants were then planted. All the plants which grew from these seeds were of the tall variety. These plants were then allowed to develop normally, fertilizing themselves, and the seeds they produced were planted. From these seeds there developed both tall and dwarf varieties but there were three times as many of the tall as of the dwarf. When the self-pollinated seeds from this crop were planted, only dwarf peas grew from the seeds which had come from dwarf plants, but the seeds from the tall variety again produced both tall and dwarf plants, with five times as many of the tall as of the dwarf variety. This proportion continued generation after generation. However, by selection Mendel was able to obtain from among the tall variety certain plants, the seeds of which would produce only tall peas.

From these observations it was obviously the rule that, whenever a pure strain, either tall or dwarf variety, was fertilized by pollen from the same variety, the seeds which developed produced only the corresponding variety; but that cross-fertilization between the tall and the dwarf varieties resulted in seeds which produced only the tall variety. From this it was concluded that, when hereditary elements which made for tallness or shortness were both present, the determinant for tallness always predominated.

This phenomenon, which has been found to obtain in a large number of hereditarily transmitted characteristics, gave rise to the designation of certain traits as "dominant" and others as "recessive." A simple example of this in humans is in the color of the eyes. It has been observed that brown eyes are dominant over blue. Consequently, if both parents have pure brown eyes all the children's eyes will be brown, or if both parents have pure

blue eyes all the children's eyes will be blue. However, if one parent has pure brown eyes and the other pure blue eyes, the children will have brown eyes or a mixture of brown with blue with the brown predominating. On the other hand if the parent has these "mixed"—hybrid—brown eyes the children may have either brown eyes or blue eyes.

Experimentally one can demonstrate the operation of this so-called "Mendelian law" by breeding black rats with white rats. In this case black is dominant over white, with the result that the first generation of hybrid rats will all be black but they will be hybrid black, that is, carrying the gene which makes both for black and for white fur. If this first generation of hybrid black rats are bred together the next generation will be one-fourth pure black, one-fourth pure white, and one-half hybrid black or mixed. Among small numbers of offspring these proportions may not hold but in large numbers these ratios will invariably hold true.

Among the more important human traits and conditions influenced or determined by heredity are the following:

1. Conditions the inheritance of which seems to follow the Mendelian pattern with the trait dominant in character: diabetes insipidus; telangiectasis (purple areas in the skin, frequently accompanied by serious nosebleeds); hypospadias (abnormal opening in male ureter); allergies; migraine headaches; Huntington's chorea (progressive mental deterioration beginning about middle age); mirror reading, cataract in young persons, glaucoma, optic nerve atrophy, hereditary night blindness, drooping eyelids, opaque ring over iris, absence of iris; progressive inner-ear deafness, word deafness, absence of ear; defective enamel of teeth; stub fingers, extra fingers and toes, stiff joints, webbed fingers or toes; brittle bones; deformed spine; dwarfism; progressive muscular atrophy, muscle stiffness; Friedreich's ataxia; pigment spots on skin, lack of pigmentation in skin and hair, fatty growths in skin (frequently on eyelids); horny skin, cysts on scalp, baldness (men only); defective hair (beaded, infantile, excessively long, woolly, prematurely gray); defective nails.

2. Conditions which are hereditary according to the Mendelian pattern but recessive in character—that is, they develop only if inherited from both parents: diabetes mellitus; jaundice of the newborn; certain types of feeble-mindedness; nearsightedness and extreme farsightedness, complete color blindness, blurred vision in strong light; albinism (skin and hair dead white with pink eyes); small fatty growths on face and scalp; skin sensitivity to light; absent nails.

3. Conditions which are transmitted according to the Mendelian patterns but are sex-linked—that is, they act as dominant traits in males and as recessive in females, appearing in males if inherited from either parent but in females only if inherited from both parents: hemophilia (defective blood clotting, "bleeders"); red-green color blindness; pink eyes without other albino effects.

4. Conditions the inheritance of which is probably Mendelian in character but whose dominance is uncertain or imperfect: cleft palate, harelip; otosclerosis (hardness of hearing due to thickened eardrums); double row of eyelashes; astigmatism; missing teeth, extra teeth; thick nails; imperfectly developed male sex organs; tendency to produce twins; left-handedness.

5. Conditions which are hereditary but seem to follow a pattern of blending of dominant and recessive characteristics: general body size, stature, weight, skin color, hair form, shape of head, and facial proportions.

6. Conditions which apparently are subject to heredity but it is uncertain to what extent they are hereditary and how they are inherited: general mental ability, memory, temperament, musical ability, literary ability, artistic ability, mathematical ability, mechanical ability, longevity; liability to hernia; some types of epilepsy and insanity, high blood pressure; cancer; psoriasis; thick or shedding skin; deaf-mutism; gout; certain defects of the glands of internal secretion; pernicious anemia; paralysis agitans; birthmarks; resistance to disease.

7. Many hereditary characteristics are neither dominant nor recessive, but are intermediate, indicating a blending of dominant and recessive factors.

## EUGENICS

The practical application of the established principles of heredity to the improvement of the human race is called "eugenics." In animals scientific knowledge in this field has been extensively utilized for the improvement of the stock. In humans similar application is infinitely more difficult. Our inheritance is so complicated and human life and liberty of action are so highly valued that it is difficult to formulate scientifically sound programs of action and still more difficult to enforce restrictive measures even upon the subnormal and delinquent portion of the population. In some states sterilization of individuals with certain hereditary defects, such as familial feeble-mindedness, has been legalized in the hope of reducing the number of children who are likely to become public charges in institutions for the feeble-minded, jails, or reform schools. More hopeful is the increasing public interest and information on this subject. Young people are coming to realize "that each one of them is a converging point of a vast number of hereditary lines" and that when they choose a life partner they are choosing more than an attractive young man or charming girl. They are choosing also his or her "family, living and all the way back."

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## Text-Films

The following McGraw-Hill Text-Film on Health Education is recommended for use with this chapter of the text, as well as for Chapter XIV.

*Human Reproduction* (21 minsd motion picture). Models and animated drawings explain the reproductive systems of men and women, and the process of normal birth. Film emphasizes the importance of clear and objective understanding of these facts as the basis of successful marriage and parenthood.

Silent follow-up filmstrip based on material contained in the motion picture offers opportunity for review, testing, and further discussion.

*Chapter* XV

# HEALTH PROBLEMS OF ADVANCING YEARS

LONG before our high-pressure modern era Seneca wrote: "Man does not die; he kills himself." And Moscowitz, discussing the increasingly important problem of high blood pressure, speaks of the "tragedy of the successful man." The greatest asset for a long life that one can have, according to a study of Dr. Raymond Pearl, is to have long-lived ancestors. Next in importance comes temperament; the calm, contented type live longer than those who are nervous, irritable, and inclined to worry. Strenuous exercise and heavy muscular work after forty are liabilities to long life. Even robust health is not so important as one would suppose, for a considerable number of individuals in Pearl's series who lived to a ripe old age reported that they had been sickly or frail throughout a part of their lives.

## Degenerative Diseases of the Heart and Blood Vessels

Of particular importance among the diseases of adult life are the degenerative diseases of the arteries, as they ramify in all parts of the body. Their inner walls break down and in them a fatty material is deposited. This in time further breaks down and is replaced by deposits of a bony substance, called "calcium." The result is the condition known as "arteriosclerosis." In places where arteries run close to the surface, as in the wrist and over the temples, these hardened slatelike vessels may be

felt. Such arteries will not permit the usual amount of blood to pass through them; hence, whatever organ or group of cells was supplied by such weakened arteries must then suffer from a diminished supply of blood. When these changes take place in the pancreas, we have the diabetes of middle-aged people; when the brain suffers by such derangements in its blood supply, we get the dementias and personality disorders of old age. And when the vessels of the kidney become sclerotic, we have a type of the well-known chronic Bright's disease.

Interference with the flow of blood also occurs when there is constriction of the small arteries due to spasm. This spasm in turn is the result of an overactive nervous system. However, if life is to continue, an adequate flow of blood must be maintained. When the size of the opening through which the blood must pass is reduced, the flow can be kept up only by having the blood come up to the obstruction under greater pressure from behind. A greater "head" is needed. Nature provides for this by increasing the blood pressure. This means, however, more work for the heart. To meet this increased demand the heart enlarges and thereby has its reserve diminished. For a time this is not serious but eventually the reserve becomes so greatly reduced that a sudden strain causes the heart to fail.[1]

Still another cause for the final destruction of the individual may arise on the basis of these narrowed and obstructed vessels. Blood can no longer course through them readily and rapidly; it slows down. There is then a tendency for clots to form inside of the vessels. These clots are called "thrombi." When thrombi occur in the blood vessels which supply the heart muscle, we speak of the condition as "coronary thrombosis." The obstruction, partial or complete, of these blood vessels is frequently accompanied by severe attacks of pain, called "angina pectoris." This pain usually originates in the region of the heart and radiates to the left shoulder and down the left arm. Coronary thrombosis is a common cause of death in heart disease. It apparently is considerably more frequent among individuals in occupations involving primarily mental work than among

[1] Note records of your blood pressure during your college years, Appendix B.

manual workers, and more frequent among physicians than among any other occupational group.

Sometimes clots float about in the blood stream. They are then called "emboli." Floating along, one may reach a vessel too small for it to pass through and it stops. Whatever tissue may lie beyond it awaiting a blood supply will thereafter be cut off and the tissue of which it is composed will die. Emboli thus may destroy large areas of tissue in kidney, spleen, lungs, liver, and brain.

Sometimes the small, weakened, brittle arteries of the brain break and hemorrhage occurs into the surrounding tissue. This is called "apoplexy." The paralysis which usually follows a stroke of apoplexy is due to the pressure of the hemorrhage upon the brain cells. If the hemorrhage is large and not promptly absorbed, disintegration of these brain cells with permanent paralysis may follow.

These degenerative diseases of the circulatory system represent the end results of accumulated injury from excesses or inadequacies of diet, physical and nervous strain, or infections and poisons in constitutionally susceptible individuals. The damage that has been done cannot be repaired. But further progress of the condition frequently can be retarded by modifying the habits of life so that the strain upon the system is reduced to a minimum.

## Cancer

The fear of cancer is prominent in the minds of most persons past middle life, and well it may be, for one woman out of every eight and one man out of every fourteen over forty years of age will die of cancer. Cancer is a condition in which the cells in certain tissues of the body begin to reproduce wildly and without limit. For example, cells in the breast, in the stomach, in the skin, or in some other tissue grow beyond their natural limits and invade other tissues and organs. That is called "cancer." It is not, as many believe, an ulcerating process, although, because of its low vitality, cancer tissue easily becomes infected if exposed to injury.

Cancer has aptly been likened to a vigorous, fast-spreading weed that invades a healthy lawn and crowds out and kills everything around it. Yet, as this weed begins to grow, its first shoots are so similar to the grass that it may not be detected by any but the most skilled.

Cancer is not hereditary, so there is no occasion for worry because a parent or a grandparent has developed cancer. The unusual prevalence found in certain families suggests a familial susceptibility but is not conclusive evidence that the disease is hereditary. Members of such families are naturally concerned about cancer and should inform themselves about the disease, its diagnosis, treatment, and prevention.

The prevention of certain types of cancer is distinctly within the realm of possibility. Particularly is this true of those cancers which develop as the result of chronic irritation. In this category belong cancers of the tongue, cheek, lip, and certain cancers of the skin and female genital organs. Tobacco chewing and smoking, jagged teeth, unhygienic mouths, alcohol, and syphilis all favor the development of cancer of the tongue. In this country cancer of the tongue is approximately ten times as prevalent among men as among women; but in India and Ceylon, where the chewing of betel leaves is more common among women than among men, the prevalence of cancer of the tongue in the sexes is reversed.

Cancer of the lip is many times as frequent among men as among women and particularly common among smokers. On the other hand, nonsmokers may develop it and many who have smoked for years never do. It usually appears on the lower lip at a point which is subjected to continual irritation as from a broken or decayed tooth, a rough hot pipe stem, or hot cigar or cigarette smoke. No one should neglect persistent sores or unusual spots, crusts, or growths on the tongue, lips, or cheek.

Cancer of the skin may develop as a result of irritation by burns, infections, soot, coal tar, petroleum, and aniline dyes. Any sore that does not heal within a month should be investigated for the possibility of cancer. Moles or pigmented warts which are located where they may be irritated by clothing,

shoes, or shaving should be removed, for they may begin to grow and, when they do, they become among the most malignant of cancers.

Cancer of the female genital tract frequently develops from chronic irritation produced by an injury which occurred during childbirth. Hence, repair of such injuries is a preventive measure against cancer.

The successful treatment of cancer depends upon its complete removal by surgery or destruction by x-ray, radium, or cautery. In its early stages cancer is a local collection of cells and is easily removed. Later when the cancer cells have invaded surrounding tissue or have spread through the blood or lymph vessels to other parts of the body, complete removal becomes impossible. Hence, cancer can be treated successfully only when it is diagnosed early.

Early diagnosis would be facilitated if everyone in the cancer age would have a thorough physical examination once a year or, better still, once in six months. Such examinations would discover some early and unsuspected cancers and lead to the correction of other conditions which physicians recognize as precancerous. Furthermore, many deaths from cancer will be prevented if the public ever learns that chronic indigestion or abnormal bleeding from the bowel or genital tract should be investigated; that every woman who notices a lump in the breast should consult a physician (usually these lumps are unimportant, but in case of doubt they should be removed and examined microscopically); and that a sore of the skin, lip, cheek, or tongue which persists for more than a month or six weeks may be cancer.

There is no medicine, diet, or serum that will cure cancer. Ointments and plasters are worthless and massage and manipulation tend to disseminate cancer cells throughout the body. The cancer quack is the most despicable of all the vultures who prey upon human misery. He alleges to cure cancer without surgery, to take it out by the "roots," using electrical treatments, salves, light, diet, etc. His treatment is worthless, but worse still, while the patient relies on his treatment, the cancer progresses until even the best of medical care is unavailing.

## Rheumatism

"Rheumatism" covers a host of aches and pains which, although rarely fatal, cause an enormous amount of discomfort and disability. If joints are involved, the more specific term "arthritis" is used. In childhood and early adult life, acute rheumatic fever or so-called "inflammatory rheumatism" with involvement of the heart is the rule; in later life the chronic types predominate. These may be merely annoying, partially handicapping, or completely incapacitating over a few months or many years. Devastating, demoralizing pain and greater or lesser deformity are its outstanding features.

The cause of chronic arthritis may be an infection at the root of a tooth, in a sinus, tonsil, or some more remote portion of the body. Metabolic disturbances are responsible in certain cases, as also are severe physical or emotional shock, fatigue, injury, exposure, abnormal weight, inadequate diet, and constitutional or hereditary predisposition.

Treatment of arthritis should be based upon a determination of its type and a thorough search for its cause. The removal of foci of infection, vaccines, dietary measures, etc., are of definite benefit in selected cases. Drugs, such as sodium salicylate and aspirin, reduce the pain and sometimes seem to be beneficial. Heat, whether applied by baking, hot applications, electricity (diathermy), or various types of baths, relieves pain and in some cases produces lasting improvement.

Rheumatism is one of the most lucrative fields for all sorts of irregular medical practitioners. The methods which they employ are legion, including various kinds of baths, manipulations, electrical treatments, diets, foot twisting, and mental healing. Yet each one has its cures and some of them number their adherents by the thousands. This is largely because there is a big nervous element in arthritis, the pain causing nervous irritation, and the nervous irritation aggravating the pain. Then, too, arthritis normally goes through cycles of improvement and relapse. Consequently, any treatment in which the patient has confidence is likely to be of some benefit; and if this happens to be applied at a time when improvement is about to occur anyway, "miracu-

lous results" are obtained. There is no panacea for arthritis, but intelligent, individualized, and patient treatment will give considerable relief in most cases and lead to permanent improvement in some.

Researches recently reported by Drs. Hench and Kendall of the Mayo Clinic indicate that the injection of a substance from the cortex of the adrenal gland gives dramatic relief to many persons long crippled by rheumatism. This material does not cure rheumatism, but it does give relief so long as the patient continues to receive it. This suggests that, like insulin, the substance given is replacing a similar substance which the body needs but which is either absent or present in insufficient amounts.

## Respiratory Illnesses

Respiratory illnesses occupy a position of major importance among the causes of illness and death in every age group but become increasingly important in the upper decades of life. With advancing years common colds become less frequent, but chronic bronchitis, asthma, and pneumonia are more common and more serious. All too often these are accepted as an inevitable accompaniment of age and the possibilities of obtaining relief are neglected. The cause of asthma frequently can be determined and eliminated. Bronchitis may be secondary to sinus infection, to excessive smoking, or to some other remediable general condition. Or what is thought to be chronic bronchitis may be a low-grade chronic tuberculosis. Many an elderly person with tuberculosis is in reasonably good health himself and yet is a danger to others. No aged person with "chronic bronchitis" should be permitted in a home with young children unless it has been demonstrated that this chronic bronchitis is not tuberculous.

## Digestive Disturbances

Many digestive disturbances make their appearance or assume major importance in adult life. The effects of dietary indiscretions, nervous tension, indigestion, and ill-advised efforts to correct constipation accumulate over the years to produce distress and disability.

## Weight

Excessive weight is disadvantageous to health and longevity throughout adult life, but its hazard becomes greater with increasing age. According to life insurance computations the lowest death rate among persons over forty-five to fifty years of age occurs in those who are 10 to 20 pounds *under average weight.* This does not mean that weight loss is necessary but merely that the weight which is desirable at the age of thirty should be maintained.

## Sexual Adjustment

Most of the reproduction of the race takes place during the first twenty or thirty years of adult life. During this period the sex glands are active and the sex emotion prominent. Then between forty and fifty there is a cessation of reproduction by women and a diminution of sexual activity on the part of men.

This change, the so-called "menopause," is anticipated with dread by most women. It is said to involve unpleasant physical and mental changes; and it pronounces with finality that youth is passed. Physiologically what occurs is that the ovaries cease to discharge an ovum once each month. This makes unnecessary the continuance of menstruation, which is the preparation of the uterus to receive this ovum. Simultaneously, the internal secretions which are related to sexual activity and reproduction are diminished.

During the period in which readjustments of glandular activities are taking place there may be physical and emotional disturbances. Irritability, jealousy, despondency, and self-pity may make life almost intolerable. During this stage, temporary though it is, sympathy and understanding by those who are near and dear are essential to happiness and peace of mind. Ordinarily no medical treatment is necessary but the counsel of the family physician is helpful. Anxiety and unnecessary worry may thus be obviated, and occasionally special treatment with the glandular secretion which is diminishing too rapidly may be indicated.

The passage of this period is followed by a stability and poise never before attained. The impetuous years of life are over but the future holds broader interests, greater sympathy, and maturity of understanding. And sex life is not necessarily ended, for with the burden of childbearing and the hazard of pregnancy removed, some women, according to an eminent gynecologist, experience a more satisfactory sex life after fifty years of age than before.

The reproductive life of men does not cease so abruptly as does that of women. There is instead a gradual diminution of sexual urge and activity. Failure to recognize and adjust to this, however, may give rise to serious emotional conflicts and psychological situations.

## Periodic Health Examinations

The money value of the average male of forty, according to computations of Dublin, is $25,794 if he is in a $2,500 maximum income class, and $45,500 if he is in a $5,000 maximum earning class. Anyone with an automobile or a piece of machinery worth $25,000 or $45,000 would give it the best of treatment and care, particularly if he knew that he could never have another one. The suggestion that one should have a periodic health examination is merely saying that one should bestow upon the only body that one will ever have as much care and intelligence as one would give to a piece of fine machinery.

Many defects and diseases do not produce recognizable symptoms until they become advanced, but thorough, careful physical examinations performed periodically will discover many of these conditions at a time when their progress can be arrested. Life insurance companies have found that such examinations pay big dividends in the prolongation of the lives of their policyholders and so provide such examinations free of charge. For children periodic examinations are recommended semiannually, and for young adults annually or biannually. But with advancing age examinations should be more frequent, for this is the period in which degenerative processes make their appearance and become rapidly progressive (see Appendix B).

## Diabetes

One of the diseases frequently discovered by means of health examinations is diabetes mellitus, or sugar diabetes. It is estimated that there are a million unknown diabetics in the nation. Most of these are overweight and are the relatives of diabetic persons. In this disease the body's capacity to utilize (*i.e.*, oxidize) carbohydrates is reduced, as the result of a deficiency of insulin. The reason for this deficiency is a degeneration of the insulin-secreting cells of the pancreas, although why these cells degenerate is still unknown. At the present time there is no cure for diabetes. However, if the disease is discovered early, its progress can be controlled and life prolonged by restriction of fats and carbohydrates in the diet and the injection of insulin prepared from some other animal.

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*Chapter* XVI

# CHOOSING A HEALTH ADVISER

MODERN medicine is built not upon unproved theory or untenable hypothesis but upon careful observation and research. The admonition of the ancient Greek physician Hippocrates to his pupils "to observe and record for mankind" has been followed through the ages. From time to time theories have been propounded to explain observed phenomena, but each one has been thoroughly tested and tried and if found wanting has been discarded.

The progress made in scientific medicine during the past century has exceeded that of all earlier time. Patient research and brilliant observation have unraveled the mysteries of one disease after another and have pointed the way to their prevention and cure. Much that seemed impossible has been achieved. But the end is not yet, for research and investigation are being carried forward as never before. New discoveries, observations, conclusions, and techniques are constantly being presented to physicians in order that they may deal more effectively with the health problems of mankind.

Charlatans and quacks maintain that the medical profession is unsympathetic to new ideas, new forms of treatment, and new discoveries. Nothing could be farther from the truth, as is evidenced by the ready acceptance of insulin for diabetes and liver therapy for pernicious anemia. On the other hand, the public

would be in a sorry plight if physicians adopted every proposal which is made in the name of health. Medical science has never been static. Physicians are more than willing to use any form of treatment that will benefit their patients. All that they ask is reasonable evidence that the treatment is safe and has real merit.

The training of physicians is carried on primarily in the great universities of the country, many of which are privately endowed, others state supported. This is particularly notable in view of the fact that all the schools for the training of the practitioners of the healing cults are without university affiliation.

## The Cost of Medical Care

Recent discussion concerning the cost of medical care has created a general impression that this cost is excessively high. Yet analysis of the facts shows that each year the American people spend more than twice as much for tobacco as they spend for the services of physicians and dentists. It would hardly be unreasonable if they were to spend as much on the maintenance and improvement of health as is spent upon a habit which at best is unprofitable. Furthermore, they waste more than a third as much on commercially advertised preparations for self-medication as they spend for all medical service.

On the other hand, the occasional illness is extremely expensive. It may wreck the family finances. But most of the cost is for hospitalization, nursing care, and other expenses incident to the illness rather than for medical service itself.

The problem of providing for the cost of medical care can be solved for those with incomes by budgeting. For other essential services one expects to pay regularly; why not for medical service? Disability insurance should be carried as protection against the major hazards of prolonged illness and unemployment, but regular medical and dental service can be provided without hardship by budgeting or regularly saving for this purpose. County medical societies in some parts of the country are offering plans to assist persons of moderate means to meet the costs of medical care on a budget basis. For persons of little or no income other plans are being considered.

The system of private medical practice, which has always existed in this country, is founded upon the free choice of physician by the patient and the payment for professional services on an individual fee basis. The amount of the fee usually depends upon the type of service rendered, the eminence of the physician, and the ability of the patient to pay. Most physicians care for many patients from whom they receive little or nothing in payment for their services, but they are able to do this because of the larger fees which they charge to those in good financial circumstances. In utilizing this sliding scale of fees physicians have long followed a principle which more recently has been incorporated into our income tax laws.

While this system of medical practice has given to the American people probably the very best medical care found anywhere in the world, it does not adequately meet the needs of all groups. During the past decade the problem of providing medical care for low income groups has been receiving increasing attention. European countries have developed various types of plans to meet this problem. Some of these are on a compulsory insurance basis (England and Germany); others are supported out of tax funds and administered by the government (Norway, Sweden, Russia). In certain of these countries a high quality of medical service has been maintained, but in others the service has been inferior and both the physicians and the public have suffered.

In the rural provinces of western Canada, where it was impossible for physicians to earn a living in private practice, various communities have arranged to employ physicians out of public funds. In this country also, various modifications of the system of private practice have grown up to meet special situations. Medical schools and the larger hospitals have long maintained free clinics for those unable to pay. In many localities relief funds can be used to provide necessary medical services. Certain industries have established their own medical departments to safeguard the health of and provide medical care for their employees. Most colleges and universities have developed excellent health services for their students. States operate public hospitals for patients with tuberculosis, mental illnesses, and contagious

diseases, and health departments aid physicians in the provision of better care for mothers and infants and in the diagnosis and treatment of such diseases as pneumonia, diphtheria, syphilis, gonorrhea, and tetanus.

Of special interest in this connection is the recent development throughout this country of Blue Cross hospital insurance plans. These are nonprofit organizations, most of which are operated on a state basis. Although they have been well established for only about ten years, by July, 1948, some 30,000,000 persons were insured against the costs of hospitalization under these programs. The costs of and the benefits provided by these plans are not standardized, but on the average for approximately a dollar a month one obtains coverage for all or most of the hospital costs of illness over a period of 3 to 4 weeks. Similar plans, called Blue Shield, are now offered which provide coverage for professional medical services. By the end of 1948 some 10,000,000 persons were covered by this insurance.

At the present time numerous studies and some experiments are being made to determine whether modification of the traditional system of medical practice should be made to meet the needs of low-income groups and, if so, what plans are best adapted to various situations. Obviously a type of plan which would be satisfactory in an industrial urban community might be ill-suited to the conditions in a small town or a rural community.

One of the considerations which is fundamental to the development of any sound program for the extension of medical service is that the service shall apply first to those conditions for which we have effective preventive and curative measures. If funds and facilities were unlimited, it might be justifiable to attempt to provide everything in the way of medical and hospital care for all people, but with limited funds the only intelligent basis upon which to proceed is to provide the essential services first and to postpone the expensive refinements and frills of medical care. Otherwise, available funds will be dissipated so widely that little or nothing will be well done. Above all, it is essential that plans for the provision of medical care safeguard

the quality of the service rendered. To fail to do so would be a catastrophe for both the public and the medical profession.

The late President Coffman of the University of Minnesota has said that there are certain things in life for which we pay whether we have them or not. He was referring to education; but the same might well be said of medical care. If we fail to pay for it in dollars and cents, we will pay for it eventually in terms of inefficiency, illness, disability, and possibly even life itself.

## Choosing a Physician

The casual way in which most people go about the selection of a physician to act as personal or family health adviser suggests that they little appreciate the importance of this choice.

The standards of training for physicians and the ideals of service set up by the medical profession are of the very highest, but, after all, physicians are only human and so practice their profession with various attitudes and various degrees of proficiency. Against incompetent and dishonest physicians medical licensing boards of the various states are providing the public with considerable protection. Before one is licensed to practice medicine one must present evidence of graduation from an "approved" medical school, of good moral character, and in most states of hospital experience. Then one must pass examinations in the various branches of fundamental science and medical practice. Another safeguard is set up by the county medical society, which has its own qualifications for admission and occasionally refuses membership to a physician, even though he be licensed to practice in the state.

In small communities where everybody knows everybody else, the choosing of a physician is rarely difficult. But in larger cities there are many general practitioners and specialists about whom one knows little or nothing. It then becomes a problem to know how a wise choice may be made.

Several years ago a letter was sent to the deans of the leading medical schools of this country asking them how they would advise a person who was new in a community to select a compe-

tent physician. Some of the deans replied that there is no way in which this can be done, but others made interesting suggestions. Among these was that one should ask the superintendent of a leading hospital for recommendations. This is sound advice, for the better hospitals choose carefully the physicians on their staffs; hence, one would be quite certain to get a competent physician if one made a selection from this group. Another suggestion was that one get a list of physicians from the secretary of the county medical society, with the school from which each graduated, his hospital experience, postgraduate training, and length of time in practice. Another suggested that one ask one's friends what physician they would call if their own doctors were not available. Such recommendation would be free from the element of personal friendship which so frequently exists between patient and physician. Still another suggested that one inquire as to who takes care of certain doctor's families when they are ill. Physicians rarely care for members of their own families for fear that personal concern and anxiety may interfere with sound medical judgment. That same anxiety, however, leads to the careful selection of another physician to assume this responsibility.

If there is a medical school in the community or even in the state, an inquiry addressed to the dean should result in helpful suggestions. Or if one who already has a trustworthy physician is moving to a new community, he can ask his physician to make inquiries as to whom he should go in the place to which he is moving.

The size of a physician's practice is not always a dependable criterion of his medical ability; for personality, self-confidence, salesmanship, and similar qualities may enable a mediocre physician to build up a big practice. In general, however, ability is rewarded in the practice of medicine just as in other fields of human endeavor. One possible objection to the selection of a physician with a large practice is that he may be too busy to give adequate time to the minor illnesses and health problems of those who are in reasonably good health. Neither is the doctor who "puts on the best show" or makes the most positive di-

agnoses always the safest physician. The charlatan specializes in impressing his patients with ceremony, x-rays, and other scientific-looking equipment and is never in doubt about a diagnosis.

*The General Practitioner.* The good old general practitioner, who diagnosed all of the family ills, brought the children into the world, pulled grandfather and the babies through pneumonia, and father through typhoid fever, removed tonsils and appendixes, and served as veterinarian, priest, and mailman, belongs to a past generation. Medical science has advanced too rapidly and too far for one man to be proficient in all fields. This has led inevitably to specialization in medical practice.

This does not mean that the family physician is an institution of the past. On the contrary, in this age of specialization the need for a family health adviser is greater than ever before. This modern family physician, however, no longer attempts to do everything himself. He knows his patients, provides most of the medical care they need, and advises the services of specialists when necessary. Such is the family physician of today and tomorrow.

*Specialists.* Specialization in the practice of medicine has been developed to such a degree that it is becoming confusing to physicians as well as to laymen. A few years ago we had the surgeon and the internist. Then the obstetrician, the pediatrician, the orthopedist, the dermatologist, the neurologist, the gynecologist, the urologist, the oculist, the rhinologist, the otologist, the laryngologist, and the psychiatrist made their appearance. But even this was not the end, for we have in addition the roentgenologist, the gastroenterologist, the proctologist, the bronchoscopist, and specialists in tuberculosis, diabetes, blood diseases, metabolic diseases, and the diseases of internal secretion; and surgeons who specialize upon the brain, the chest, the bones, and upon children.

Such an array of queer names seems bizarre but for each of these specialists there is adequate justification. The more a physician concentrates his attention upon one particular system of the body or upon one diagnostic or therapeutic procedure, the

more proficient he will become in that field. For the broad specialties of internal medicine, surgery, obstetrics and gynecology, pediatrics, and diseases of the eye, ear, nose, and throat there is frequent need. The services of the others are less frequently necessary but the skill of the highly specialized bronchoscopist or brain surgeon occasionally means the difference between life and death for the patient.

But when should one go to a specialist and how is one to know which specialist can best render the service needed? On these points the family physician can give valuable advice. Many conditions for which patients go directly to specialists could be treated just as satisfactorily and in some cases more satisfactorily by the family physician. The specialist makes an invaluable contribution to the health of the community, but one needs advice as to when and how best to utilize his expert service.

The services which specialists are called upon to render make it obvious that special training and experience are necessary and it is important for the patient that the specialist whom he selects be thoroughly competent in his special field. State licensing boards do not set up specific requirements for practice of the specialties of medicine but physicians in the various specialties are doing so themselves. In general 3 to 5 years of special graduate study and actual experience in an approved institution are required in order to qualify for the rigorous examinations by the specialty boards. The physician who meets all of the requirements is granted a certificate by the board before which he has qualified, such as the American Board of Ophthalmology, of Surgery, of Obstetrics and Gynecology, of Internal Medicine, of Urology, and of Roentgenology. One can be certain that a physician who possesses a certificate of one of these boards is thoroughly qualified for the practice of that particular specialty.

*Clinics.* Physicians in various parts of the country are grouping themselves together into clinics in order to practice medicine on a cooperative basis. These clinics usually contain physicians in general medicine as well as surgeons, pediatricians, obstetricians, nose and throat specialists, etc. By frequent consulta-

tions and the pooling of laboratory and x-ray facilities the group hopes to provide better service than the patient would ordinarily receive if these same physicians were practicing independently.

There are clinics to which I would be perfectly willing to send members of my family for medical care, even if I were not acquainted with any of the physicians in them. This is because I know that the quality of service which they render is of the best and that no physician would be on the staff if he were not thoroughly competent. On the other hand, clinics are no better than the physicians of which they are composed, and there is a possibility that in the clinic type of organization personal interest in the patient may be submerged to efficiency in the functioning of the organization as a whole.

## What to Expect from a Physician

Having selected a physician, what should one expect from him? In the first place, he should render careful, conscientious, interested service during illness, utilizing such facilities and obtaining such consultations as are necessary to arrive at a diagnosis and provide adequate treatment. In some diseases it is possible to make an accurate diagnosis upon first examination, but others require careful study and observation before the nature of the illness can be determined. In addition, he should give advice on minor problems of health and illness. He should advise and administer vaccinations and immunizations of established value; and he should perform periodic examinations of each member of the family.

With confidence in the physician of one's choice, the wisest procedure is to follow his advice concerning diagnostic and treatment measures. He will not perform miracles but will steer one on the best known course back to health. If one is not completely satisfied, a consultation may be requested; or if confidence is completely lacking, a change of physicians may be made.

As a result of procrastination, physicians are called upon chiefly to repair damage which has already been done. This is unfortunate, for the most valuable service that physicians can render lies in the field of prevention. The physician of today has

infinitely more to offer as a health adviser than did the traditional family doctor of the past. Given an opportunity in this capacity he will render the most distinguished service of all.

One hears complaints from time to time about difficulties in obtaining the services of a physician, particularly to make house calls and at night. Most of this could be avoided if people would select the physician of their choice and get acquainted with him before illness strikes. The physician will then know the patient and his family and will feel a special responsibility for their welfare. The response to a night call from a regular patient is quite different from that to a call from a total stranger.

## Healing Cults

Irregular systems of medical practice exist in every land but in no enlightened country do they find such ready acceptance as in the United States. Possibly this is because we have been following unbeaten paths to find material wealth in unexpected places and so are hopeful that we may discover the secret to health in a similar manner. Possibly it is because we like to gamble and dislike to face reality. Or possibly it is because we believe in giving everybody a chance. At any rate we are the most credulous people in the world on medical matters.

The criterion of the healing cult is that it propounds a single theory as the explanation of disease and offers a single form of treatment for its cure. The ideas upon which cults are based are not developed by careful study or investigation but usually come as a vision to one with little or no training in biological science. Such phantasies occur to many people, but only occasionally are they put into practice by one who has the personality and good fortune to obtain a following.

## Medical Quacks

The medical quack may be a physician or a practitioner of one of the cults or may lay no claim to any sort of medical education whatsoever. His only purpose is to exploit human misery for personal gain. His technique may be to promote a dietary fad, sell reducing salts, give electrical treatments, or twist feet;

or he may proclaim himself a "specialist" in cancer, in "diseases of men," or some other condition.

The quack usually claims to employ a secret form of treatment with which he obtains miraculous cures. This in itself should be a warning that his motive is selfish personal profit. Otherwise he would not keep his treatment secret but would publish his discovery, as is the custom of physicians and scientists, so that it might be utilized to relieve the suffering of mankind everywhere. But this he dare not do, for he knows that his methods will not stand the light of day and that they are of value only to him and then only so long as they are kept secret.

A few years ago an extensive piece of quackery was perpetrated on the American public with the aid of a machine which was said to adjust radioactive waves of the body which were out of harmony, thereby giving rise to disease. Diagnosis and treatment consisted merely of turning some dials. These machines, which were supposed to cure everything, were sold or leased only on condition that they would not be opened. A few physicians fell for this racket, but its mysteriousness appealed particularly to the cults by whom it was widely used and still is used to some extent.

An investigation of the machine by one of Mr. Ford's electrical engineers revealed only a storage battery, a few simple coils, a buzzer, and a meaningless jumble of wires. This "marvelous invention" was developed by a physician in California, who must have chuckled at the gullibility of human nature as a fortune came pouring in.

## Self-medication

The amount of money spent in this country for self-medication is several times as much as that which is spent for drugs prescribed by physicians. The magazine *Drug Topics* reported the sale of "home medicaments" in 1947 as $547,597,000. Nobody knows exactly what this is spent for, but probably the big advertisers get most of it. It is certain that the public gets little of value from it.

The preparations used for self-medication vary enormously

in content, purpose, and importance. Some are standard drugs of known composition, such as aspirin, soda, and Epsom salts, the use of which in general is safe and in some cases unobjectionable. Claims that aspirin will prevent or cure colds are unfounded, but it relieves pain and headache, lowers fever, and is somewhat sedative. Epsom salts is a good cathartic but should not be used regularly.

Antiseptics, such as tincture of iodine or methiolate, for use on cuts and abrasions, have a proper place in the home medicine cabinet. So also has aspirin for headaches and a mild cathartic; but these and others which might be added should be selected and used according to the advice of one's physician.

Preparations of unknown composition with copyrighted names belong to a different category. Some are harmless but entirely worthless—just plain fakes. Others consist of standard drugs packaged to sell at fancy prices. Still others contain drugs that are actually dangerous, such as the pyramidon and the potentially toxic and habit-forming acetanilid found in many headache and cold remedies.

Furthermore, it is important to realize that, except for atebrine and quinine in malaria; the sulfonamide drugs, penicillin and other antibiotic drugs in certain infections; emetine and arsenic in amebic dysentery; bismuth, mercury, and arsenic in syphilis; chaulmoogra oil in leprosy; and antimony in certain tropical diseases, the drugs we use are not specific cures for disease but are of value because they control undesirable reactions, support some body function, or alleviate suffering. The physician who prescribes them does so for specific reasons in an individual case. One patient with abdominal cramps may be relieved by a cathartic, while another may suffer a ruptured appendix from the same treatment.

The principle of self-medication is unscientific and unsound, as is well expressed by the maxim, "He who hath himself for a doctor, hath a fool for a patient."

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# Chapter XVII

# COMMUNITY HEALTH

Life in urban communities and modern methods of transportation contribute enormously to the comforts and advantages of life, but they also bring with them health hazards which can be minimized only by group action. For this reason a discussion of healthful living would be incomplete without some consideration of community health problems and practices.

Among the more important health services which can be provided only by group action are the control of communicable diseases, the provision of adequate and safe water supplies, the sanitary supervision of milk and other foods, waste disposal, accident prevention, school health service, industrial hygiene, hospitalization, and medical, dental, and nursing care for those unable to provide these services for themselves. Most of these subjects have already been discussed from the point of view of the individual; a few will be considered also from the point of view of the community.

## Communicable Diseases

A communicable disease is one which may be transmitted from one person or animal to another in any manner whatsoever. When such diseases occur singly, they are said to be sporadic. When a communicable disease is present more or less continuously in a community or region it is said to be "endemic." If it

attacks large numbers of people in a community or region it is said to be "epidemic." If it spreads over a large region or over the world, it is called "pandemic."

The communicable diseases are all caused by living organisms, commonly spoken of as "germs." Most of the germs which cause diseases of man have become adapted to living under the conditions that exist in the body of man and so are able to survive only a relatively short time outside the body, except when cultivated in the laboratory under conditions which approximate the conditions of the body. For this reason the greatest source of infection of man is some other person. This person may be one who is actually sick with the disease; or one who, although infected with the disease, has such a mild attack that it is not diagnosed, so that he continues about his duties exposing others; or one who has recently convalesced from the disease; or one who, although well, harbors the germs of disease in his body and scatters them about to infect others. This last type of individual is commonly called a "carrier."

*Routes of Dissemination.* Infective germs are obviously of no danger to anyone else so long as they are retained within the body of the person who is a patient or carrier. It is the germs which get out of the body that cause the infection of others. The routes by which these germs escape from the body depend upon the portions of the body infected. Most common of all routes are the nose and mouth, the discharges from which are responsible for a large number of diseases and are most difficult to control. Among the more important of the diseases spread through the discharges of the nose and mouth are colds, influenza, pneumonia, tonsillitis, scarlet fever, diphtheria, measles, whooping cough, mumps, meningitis, poliomyelitis, tuberculosis, and leprosy.

Diseases disseminated through discharges of the intestinal tract are for the most part those which enter the body with the food and drink and localize primarily in the intestinal tract. Most important among these are typhoid fever, paratyphoid fever, dysentery (amebic and bacillary), cholera, hookworm, and other intestinal parasites.

Among the intestinal parasites, hookworm differs from the

others in that its usual portal of entry is through the pores of the skin between the toes. In this manner hookworm larvae get into the blood stream. By the blood they are carried to the lungs, but, being too large to pass through the tiny capillaries, they burrow through the thin membranes into the alveolar sacs; thence, they pass up through the bronchial tubes and trachea to the mouth to be carried with the saliva to the stomach and to the small intestine where they set up the infection which is characteristic of the disease.

The venereal diseases are most commonly disseminated by discharges from the genital tract. Streptococcic infections, including scarlet fever, may be disseminated by the pus from infections which discharge to the surface of the skin or mucous membrane or from infected middle ears or sinuses. Trachoma and the various types of conjunctivitis are disseminated by the infected discharges from the eye. From infected areas of the skin itself numerous diseases are contracted; most common among these are boils, impetigo, pediculosis, scabies, and ringworm, one type of which is called "athlete's foot."

Bloodsucking insects are responsible for the transmission of a large group of diseases through the unbroken skin. These include malaria, yellow fever, tularemia, and bubonic plague.

*The prevention of communicable diseases* in general depends upon three types of measures:

1. The prevention of the dissemination of infected material from the person who is the source of infection. This involves isolation, quarantine, and disinfection of bodily discharges and objects which may have been contaminated.

2. The blocking of the usual routes of transmission of infected material. This is the purpose of most of the measures of modern sanitation, such as water purification, sewage disposal, pasteurization and sanitary handling of milk, use of individual drinking cups, sterilization of dishes, glassware, and other eating utensils, and washing of hands.

3. Immunization of the susceptible individuals. Artificial immunization constitutes an important preventive measure against certain diseases (Chapter IX).

## Disinfection

*Disinfection*, strictly defined, is the destruction of all organisms and their products which are capable of producing disease, while *sterilization* is the destruction of all germ life, saprophytic as well as disease-producing. *Antiseptics* prevent the multiplication of germs but do not destroy them. *Deodorants* destroy and neutralize unpleasant odors but many of these have no disinfecting powers. *Fumigation* is the use of fumes or gases to destroy bacteria, vermin, or insects.

Disinfection may be accomplished by physical or chemical means. Physical methods of disinfection are chiefly dry heat, steam, boiling, drying, ultraviolet light, etc. Chemical disinfectants for the most part are applied in liquid form but may be gaseous.

All disinfectants destroy bacteria by means of physical or chemical changes of the cell substance of the organisms; consequently *time* and temperature are important in all disinfection. In general, the stronger the solution the more quickly the disinfectant will act, but *none acts instantly*. The presence of organic and albuminous matter interferes seriously with the action of practically all disinfectants except chlorinated lime and potassium permanganate.

## Safe Drinking Water

Over the years, drinking water probably has been the most serious source of epidemic diseases in urban communities, particularly transmitting typhoid fever, paratyphoid fever, dysentery, and cholera. Today, however, sanitation and public health engineering are so adequately safeguarding the public water supplies of most communities in this country that we rarely give thought to the safety of the water that we drink. This bespeaks splendid progress but there is a danger that communities may feel so secure in this regard that they become lax about maintaining adequate safeguards against infection. Several fairly recent epidemics are convincing evidence that we dare not become careless. In the first four months of 1924, Santa Ana,

California, a city of 30,000 population, had 620 cases of typhoid fever, 222 of which were due to pollution of the water supply on December 27, 1923, and 143 to a second pollution on February 7; 200 cases were due to contaminated milk and 51 to personal contact. In 1929 the city of Olean, New York, population 22,000, had 230 cases of typhoid fever traceable to the city water supply. The city accepted full responsibility for the epidemic and appropriated over $350,000 to pay damages and other costs growing out of the epidemic. In 1933, 185 cases and 19 deaths from amebic dysentery occurred in Chicago and an additional 800 cases who got their infections in Chicago were reported in other parts of the country. In December, 1932, and January, 1933, 282 cases and 29 deaths from typhoid fever occurred in Chamberlain, South Dakota, a city of 1,500 population. This terrific epidemic, with an infection rate of approximately 20 per cent of the population, was due to improper operation of the water works, which permitted inadequately treated Missouri river water to get into the city's water system.

For public health purposes water supplies may be divided into two general groups: surface and underground. Surface water supplies are those obtained from lakes and streams and are not considered safe for drinking purposes unless purified. Underground water supplies are those from wells and springs. Such supplies are practically always safe, provided they are properly located, properly constructed, and properly operated.

The water supplies of large communities are usually obtained from lakes and streams and unless too grossly polluted may be rendered safe for drinking purposes by adequate treatment. The usual method of water purification is as follows:

Water is taken from the source of supply and a small amount of alum solution added. This, when thoroughly mixed with the water, reacts with some of its chemical constituents producing a slightly gelatinous precipitate. This precipitate envelops the suspended material and carries it to the bottom of the coagulation basin. From this basin the water passes on to the filters. These usually consist of approximately 3 feet of sand, gravel, and crushed rock, with a fine sand on the surface and the gravel and

crushed rock at the bottom. The treatment up to this point removes the suspended material and a large part of the color from the water and materially reduces its bacterial content. As the water leaves the filter, chlorine, usually in the form of gas, is added to the water to destroy any bacteria that may have passed through the filter. If the source of the water supply is badly contaminated, chlorine is added before as well as after filtration.

Underground water supplies are those obtained from dug, bored, driven, or drilled wells and from springs. If wells are located in limestone subsoil, they may be polluted by seepage from cesspools or privies located at even a considerable distance. With other types of subsoil if a well or spring is so located that it is not subject to flooding with surface water, if it is so constructed at the surface that there is no opening through which surface water from the immediate surroundings of the well or waste water from the pump may get into the well, and if it is located at a distance of at least 50 feet from any source of contamination such as a privy vault or cesspool, the possibility of its becoming polluted is very remote.

The most common defects of underground water supplies are the following:

1. A location where it is subject to flooding with surface water during high water periods.

2. The improper construction of well casings and covers and lack of adequate provision for drainage away from the well at the surface.

3. Construction of well pits around the source of supply in which all or part of the pumping equipment is located. It is difficult to prevent surface and waste water from collecting in such pits and from gaining access to the well through leaks which may occur in the casings and pumping equipment.

4. Connection of well pits with sewer or drainage system. Such connections make it possible for polluted water and sewage to back up into the pit and thus pollute the water in the well.

Sanitary supervision of water supplies is necessary in order to insure their safety for drinking purposes. Investigation of small individual sources of supply is a simple procedure and their

safety can usually be determined by careful observation without examination of the water. Local officials or the owner with the aid of the information which is furnished in health department bulletins on the location, construction, and operation of private supplies can usually pass upon the safety of small private wells, springs, etc. The more complicated water supplies should be investigated by a public health engineer who is competent to make correct field observations and interpret results.

Water from unknown or questionable sources, such as the camper or traveler must use, can be rendered safe for drinking purposes by boiling for a few minutes or by treatment with chlorinated lime. Boiling drives off the dissolved air and gases, with the result that the water has a flat taste. Shaking the water in a bottle, stirring it with an eggbeater, or exposing it to the air overnight will correct this. Boiled water should be stored in covered pails or well-stoppered bottles. If one wishes to use ice to cool the water, this should be placed around the container, not in it.

Two drops of a 7 per cent tincture of iodine to 1 quart of water will ordinarily render any potable water innocuous within 15 minutes.[1] The addition of a small piece of charcoal will then remove the iodine.

Chlorinated lime in solution liberates free chlorine and so may be used to disinfect drinking water. "Clean" water may be rendered safe by the addition of $\frac{1}{10}$ part of chlorinated lime to 1,000,000 parts of water. Water containing organic material may require as much as 1 to 5 or more parts per 1,000,000. A simple method of using chlorinated lime to disinfect small quantities of water is as follows:

1. Add 1 level teaspoonful of bleaching powder, which weighs about 3.5 grams, to 3 measuring cups of water, 8 ounces each.

2. After this is thoroughly dissolved and mixed, add 1 teaspoonful of this (strong solution) to 1 gallon of water, or 15 drops to 1 quart of water.

[1] Pond, M. A., and W. R. Willard, "Emergency Iodine Sterilization for Small Samples of Drinking Water," *Journal of the American Water Works Association*, vol. 29, p. 199, December, 1937.

3. Mix thoroughly and allow to stand for at least 20 minutes before use.

## Milk Supplies

Milk and milk products are commodities which are so susceptible to contamination and adulteration that the only way of obtaining protection against fraud and against the diseases which may be transmitted through milk is by community action. The first step in the accomplishment of this is the passage of a satisfactory milk ordinance. It would seem that there should be no difficulty in passing such an ordinance, but entrenched interests in the marketing of milk, particularly the small milk dealers who wish to continue peddling raw milk because the volume of their businesses does not justify the installation of pasteurization plants, have been able to block the passage of satisfactory milk ordinances in some large and many small cities and towns.

After passage of an adequate milk ordinance the next step is to make sure that this ordinance is enforced. Most milk dealers are honest but there are some who will take short cuts in the pasteurization process to save money if no one checks up on them. The worst epidemic of typhoid fever ever reported in a modern city occurred in Montreal in 1927, with 5,042 cases and 488 deaths as a result of milk that was labeled "pasteurized" but was passed through and distributed from the plant without being subjected to pasteurization treatment,[2] or was contaminated from insanitary handling after pasteurization.[3]

Milk inspection begins with the cow, prescribing definite conditions as to health and care. The government regulates the manner in which the milk is handled from the minute it leaves the cow until it is delivered to the ultimate consumer. These regulations relate to cleanliness of utensils, temperatures at which the milk shall be stored, health of the milk handlers and cleanliness of all milk plants. Further regulations establish minimum chemical standards as to fat and mineral content, and maximum bacterial content. All of these regulations are designed to protect the product against accidental contamination

[2] "Report of the U. S. Public Health Service on the Montreal Typhoid Fever Situation," *Public Health Reports*, vol. 42, July 22, 1927.

[3] Pease, H. D., "An Investigation of Epidemic Typhoid Fever in Montreal in 1927," The Provincial Bureau of Health, Quebec, Canada, 1931.

with disease-producing germs and to safeguard the consumer against adulteration through "watering" or "skimming."

The advent of pasteurization made available a powerful weapon for further protection of the milk supply, through destruction of those harmful germs that might have found their way into milk in spite of the precautions required by the sanitary regulations. It is true that economic considerations such as the delay in souring were the most potent factors in the adoption of pasteurization by many of the larger milk companies. This economic end might have been served, however, by a simpler process than pasteurization. When it became apparent to health departments that this process, if properly performed, could be a powerful protection to the sanitary quality of the milk, the police power of the state was quickly exercised so to regulate the process as to promote the public health. This has meant elaborate regulation as to temperature and time of heating, construction of machinery, and cleansing of equipment. Almost without exception these regulations have been upheld by the courts as proper exercise of the authority of public health agencies.[4]

## Food Sanitation

The foods, other than milk, which constitute the chief potential hazards to health have been considered in Chapter IV. Against these hazards society has done relatively little to guarantee itself protection. There is, of course, federal inspection of meats sold in interstate commerce. This provides considerable insurance that the animal is free from anthrax, actinomycosis, and gross evidences of tuberculosis and other infections. This inspection, however, does not apply to meat which is butchered and sold within a state. Some states and a few cities have their own meat inspection laws, but these are not general nor usually considered very effective.

The licensing of restaurants and hotels by state or local departments of health gives considerable health protection to the public if adequate standards of sanitation are required and efficient inspection and law enforcement are provided. The same holds true for manufacturing plants and stores, wholesale and retail, which process or sell foods.

Then, too, there is a Federal Pure Food and Drug Act which was enacted in 1906. In 1912 it was amended to forbid false and

[4] Anderson, Gaylord, "Regulation in Public Health: Regulatory Administration," John Wiley & Sons, Inc., New York, 1939.

fraudulent therapeutic claims on labels of patent medicine containers, and in 1938 to include cosmetics and contrivances for diagnosis or treatment. Anderson says:

> While this law has been a powerful weapon used in certain situations and held as a potential threat, its actual use has been but one of the forces leading to a vastly improved food supply. Probably the most potent force has been the work of the federal food and drug administration in cooperation with the food manufacturers and processors. The technical experts of the government have aided the industries in the studies of those factors which lead to deterioration of the product. Thus with the elimination of these factors much of the incentive to adulteration has been removed and at the same time the industry has gained an increased public confidence. There has thus developed a system of voluntary policing of these industries by the manufacturers themselves in cooperation with the federal authorities. From the standpoint of public health this can be considered as the ideal form of exercise of the regulatory power as it rests upon public understanding of the economic and social values of those procedures which best serve the public end.[5]

In spite of the good that it has accomplished, the average citizen assumes that he is receiving more protection under this law than it actually provides. The 1912 law was worded so as to require the government to prove claims fraudulent before any action could be taken against the producer. He could not be convicted under this law unless it could be proved that he actually knew that the claims were false. If he could convince the jury that he himself believed in the value of his products, he would be acquitted. The new law does not make it necessary to prove fraud. If the court decides that a product is falsely labeled or adulterated, the manufacturers can be fined. The Wheeler-Lee Amendment to this law makes false and misleading advertising illegal. The Federal Trade Commission, which is responsible for enforcement, can issue a "cease and desist order." If this is violated, the Department of Justice brings the manufacturer to trial. For first offenses, fines up to $5,000 may be imposed. If dangerous drugs or fraud are involved, the offense is criminal and six months in jail is added to the fine. For second offenses, penalties are doubled.

The present act provides no protection, except labeling,

[5] Anderson, *loc. cit.*

against many potentially dangerous drugs which are contained in certain "patent medicines." Serious toxic results and several deaths have been reported from the use, according to directions, of various nationally advertised and widely sold medicinal and cosmetic preparations. It is illuminating to see detailed reports of the constituents, the claims, ownership, and promotion methods of many of America's most famous remedies, such as Crazy Crystals, Cascarets, Jad Salts, Alka-Seltzer, Tanlac, Marmola, Fleischman's yeast, Cherry Pectoral, Vick's Vapo-rub and Lydia Pinkham's Vegetable Compound. Studies of the subject present startling disclosures concerning the adulteration, mislabeling, and false claims made for many foods which effective and persistent advertising has led the American public to accept as standards of excellence. Clearly the country needs a still better food and drug law.

## Waste Disposal

An important duty of every community is the satisfactory removal and disposal of waste matter. Improper disposal of domestic sewage and industrial waste not only endangers the public health, but it may destroy fish and other aquatic life and become such a public nuisance as to result in depreciation of property values. Pollution of lakes and streams may render them unfit for recreational purposes and for domestic and industrial uses.

The use of streams for the disposal of sewage and industrial wastes introduces problems which are essentially of intercommunity concern. Usually the pollution occurs down stream from the municipality whence the wastes are derived. Hence the nuisance so created is of no concern to the community responsible for the nuisance but may be of vital concern to the communities down stream. Frequently these rivers pass into another state so that stream pollution acquires an interstate aspect. It is obvious, therefore, that a satisfactory solution to the problem of stream pollution requires exercise of the regulating authority by a larger unit of government than the local municipality. Many state health departments are invested with varying degrees of authority over this aspect of sanitation. Important and desirable as this may be, it does not attack the difficult interstate problems. The solution of the latter requires either interstate compacts or the investment of a federal agency, preferably the Public Health Service, with authority to regulate the pollution of interstate waters. Similar considerations apply to the pollution of tidal waters, this pollution often virtually destroying a profitable shellfish industry.[6]

[6] Anderson, *loc. cit.*

*Sewerage systems* collect domestic and industrial wastes and carry them to a point of discharge. Occasionally the discharge is directly into a river or large lake, but only rarely is there sufficient dilution to permit this without serious objection. This means that in most situations sewage treatment is necessary. Such treatment may be no more than a settling process which removes the solids from the sewage and permits the liquid part to drain off into a lake or river. On the other hand, the sewage treatment may be so complete that the end product is neither objectionable nor dangerous to health. Complete sewage treatment involves first a settling process, then oxidation, filtration. and finally chlorination of the liquid effluent.

In the absence of sewerage systems, cesspools, chemical toilets, or privies may be utilized.

*Cesspools.* A common type of cesspool is built somewhat like a large well with the sides made of bricks or stones but laid so that the water may pass between them into the surrounding soil. Solids which accumulate at the bottom are greatly reduced in volume by the action of bacteria. If cesspools of this type are properly constructed in porous soil and located so as to avoid any possibility of contamination of drinking water, they will serve as a satisfactory method of sewage disposal for a long period of time.

*Chemical closets* may be used inside the house in the absence of running water. They consist of a jar or an iron tank. The excreta are received into a strong solution of caustic soda which liquefies and disinfects the material. Tanks which permit several months' storage are emptied by drainage into a cesspool or into a scavenger wagon. These closets, which are nearly free from odor, are sold by many manufacturers and are quite satisfactory.

*Privies.* A sanitary privy requires a pit of proper depth and capacity, a tight building so constructed as to protect the excreta from flies, chickens, domestic animals, rats, etc., a floor above the ground level, a tight door that closes automatically, seat covers that close when not in use, and durable screens over all openings for ventilation. The provision of such elementary conditions of sanitation and decency would seem simple enough, but

the primitive, insanitary conditions of waste disposal which still exist throughout this country are almost unbelievable.

## Soil and Disease

Soil may be related to health because of the absence of some essential food element, such as iodine, or because it contains disease-producing bacteria or parasites. Decomposition of animal and vegetable matter in fertile soil is the result of bacterial action, but the organisms are harmless to man. The ones which produce disease reach the soil with the intestinal discharges of man or animals.

Most of these organisms produce bacterial diseases of the intestinal tract, such as typhoid fever or dysentery, or intestinal parasitic infections. Except for hookworm, the larvae of which most commonly enter the body through the skin, man can become infected from the soil with these diseases only through contamination of his food or drink. If human excreta are used for fertilizer, as is the custom in the Orient and certain sections of the tropics, contamination of vegetables is likely. Otherwise, the danger of contracting disease from the soil is slight.

The germs of tetanus or gas gangrene are found in soil which contains animal excreta. They produce disease only when they gain access to wounds of the body (page 172).

## Insects[7] and Disease

A considerable number of diseases of man and lower animals are transmitted by insects, some mechanically, others biologically.

*Mechanical transmission* implies that the insect carries the infective germs from one place to another but is not an essential link in the transmission of infection. Infective material may be carried on the body of the insect or on its proboscis, or it may be taken into the insect's intestinal tract and regurgitated or discharged with the excreta. The common examples of the mechanical transmission of disease by insects are typhoid fever, bubonic plague, and tularemia.

[7] "Arthropod" is a broader but less understood term than "insect." It covers all small animals with articulated bodies and limbs, including insects, spiders, ticks, mites, etc.

*Typhoid fever* is transmitted by the house fly. The habits of flies are such that they are very likely to carry infective material from excreta to foods if they have access to them.

*Bubonic plague* is transmitted by the fleas of rats or other rodents. The fleas take the *Bacillus pestis* into their stomachs with the blood of infected animals, then regurgitate the organisms into wounds caused by biting other animals or human beings.

*Tularemia* is transmitted by the rabbit tick, wood tick, horsefly, deer fly, etc. These insects pick up the *Bacillus tularense* with the blood of infected animals and inoculate other animals or human beings in much the same manner that the *Bacillus pestis* is transmitted by fleas.

*Biological transmission* means that the germ undergoes some stage of its development within the body of the insect; that is, the disease is not transmitted from one person or one animal to another except by passage through the insect which acts as its intermediate host. The more important among the diseases transmitted biologically by insects are malaria, yellow fever, typhus fever, and Rocky Mountain spotted fever.

*Malaria* is transmitted by the Anopheles mosquito. It is the most widespread tropical disease in the world. In the United States there are still some 250,000 new cases of malaria annually; and once contracted, the disease frequently becomes chronic. Although few attacks of malaria result fatally, a person with malaria is half sick all the time. The malarial parasite is transmitted only by the female Anopheles mosquito which breeds chiefly in natural collections of water, such as swamps, streams, lakes, open pools, and puddles. The Anopheles mosquito is a large brown mosquito which is nocturnal in its habits, biting but rarely in the bright part of the day. It takes approximately 12 days from the time that the Anopheles mosquito has its meal of blood containing malarial parasites for the development of the parasite in the body of the mosquito to be completed and the mosquito to become infective. Prevention depends upon (1) elimination of the breeding places of mosquitoes by the drainage of swamps; (2) destruction of mosquito larvae with oil, Paris

green or DDT sprays, or fish; (3) safeguarding of patients from mosquitoes until their blood is free from parasites; (4) blood examinations of persons living in malarial districts to determine which ones are infected so that they may be treated and cease to be reservoirs of infection; (5) screening of porches and houses and taking particular caution against being bitten by mosquitoes at night; and (6) administration of small doses of atebrine or quinine during the malarial season.

One of the great triumphs of modern medicine and sanitation was the control of malaria among the armed forces of our country during the Second World War. Hundreds of thousands of men lived and fought in areas of the world so badly infested with malaria that never before had white men been able to survive in them. The enemy never believed that this could be done.

*Yellow fever* is transmitted by the Aëdes mosquito. The virus of yellow fever is present in the patient's circulating blood only during the first 3 or 4 days of the disease, and it takes 12 to 14 days after ingestion of the virus by the mosquito before the insect becomes infective. Yellow fever is highly fatal, but those who recover have a high-grade immunity. An effective vaccination has recently been developed against this disease. Prevention of yellow fever, at least in civilized communities, depends primarily upon the extermination of the mosquito by which it is transmitted. This task, compared to the extermination of the Anopheles mosquito, is relatively simple because the yellow-fever mosquito breeds almost exclusively in artificial containers of water located in the vicinity of human habitation. A second effective preventive measure is careful screening of the patient from mosquitoes, particularly during the first week of the disease.

*Typhus fever*, epidemic type, is transmitted by the body louse, and the endemic, or American, type is transmitted by fleas from infected rats. For centuries typhus fever has prevailed under conditions of overcrowding and personal uncleanliness; hence its names, "jail fever," "camp fever," "ship fever," etc. This disease was one of the contributory factors to Napoleon's defeat in his attempted Russian campaign in 1812–1813. During the First World War, hundreds of thousands of people on the eastern

front died from this disease. After the louse has its meal of blood on a person with typhus fever, a developmental period of 4 or 5 days is necessary before the louse becomes infective. Prevention depends upon the avoidance of lice. The insecticide DDT, developed during the Second World War, is highly effective for the destruction of lice.

An American form of typhus fever, which is much milder than the European form, was discovered a few years ago in several states along the Gulf of Mexico. Careful studies indicate that the rat is the reservoir of infection and the flea the mode of transmission.

*Rocky Mountain spotted fever*, which is very similar to typhus fever, occurs particularly in Montana, Idaho, Wyoming, Colorado, Utah, Nevada, Oregon, Washington, California, South Dakota, and British Columbia. In Utah the disease has been mild and in Montana virulent, having a fatality as high as 90 per cent. This disease has been especially studied in the Bitter Root valley of Montana, where the occurrence of the malignant form is limited to the western slope of the valley. During the past few years, a so-called "eastern" type of Rocky Mountain spotted fever has been described. Both types are transmitted by wood ticks. The prevention of the disease is directed entirely to the destruction of ticks. Bites of ticks in infected regions should be immediately cauterized with strong carbolic acid. An effective vaccine has recently been developed against this disease.

*Other biologically transmitted insect-borne diseases*, which are less common or less serious in this country, are dengue (breakbone) fever, transmitted by the Aëdes mosquito; trypanosomiasis (African sleeping sickness), transmitted by the tsetse fly; trench fever, transmitted by the body louse; and relapsing fever, transmitted by lice and by ticks.

## Animal-borne Diseases of Man

Certain diseases of animals are transmissible directly or indirectly to man. The most important of these are (1) *bovine tuberculosis*, contracted usually through the drinking of raw milk from tuberculous cattle; (2) *trichinosis*, contracted by eating

inadequately cooked pork or pork products from infected hogs; (3) *brucellosis* or *undulant fever*, contracted from infected cattle, hogs, or goats, either directly by contact with infected animals or indirectly through their milk or milk products, (4) *rabies* or *hydrophobia*, contracted through the bite of an infected animal or the introduction of the saliva from an infected animal into an abrasion of the skin; (5) *tapeworm infestation*, contracted by eating inadequately cooked beef, fish, or pork containing the larvae of the parasite; (6) *bubonic plague*, transmitted to man from infected rodents by fleas; (7) *tularemia*, transmitted from infected animals, particularly rabbits, to man by contact or by ticks, deer flies, or other blood-sucking insects; (8) *Rocky Mountain spotted fever*, transmitted to man by the tick; (9) the American strain of *typhus fever*, transmitted to man by the flea of the rat; (10) *psittacosis* (parrot fever), contracted from infected parrots or lovebirds or their cages; (11) *actinomycosis* (lumpy jaw), contracted by chewing straw or weeds containing the causative organism.

Most of these insect-borne and animal-borne diseases constitute definite community health problems and must depend upon community action for their control. Yellow fever, plague, bovine tuberculosis, and rabies are examples of what can be accomplished. A few years ago in many sections of this country 10 to 50 per cent of the cattle were infected with tuberculosis. Today, as a result of a consistent program which the veterinarians have carried on for the tuberculin testing of cattle, and the eradication of infected animals from the herds, the last county in this country was certified on November 8, 1940, as having less than 0.5 per cent of infected cattle. Rabies, which, once it develops, is always fatal in man, has become a rare disease in most states as a result of laws requiring the muzzling of dogs, the killing of infected animals, and the Pasteur treatment of individuals who have been bitten by animals suspected of having rabies.

Much the greatest menace among the animal-borne diseases in this country today is *brucellosis*—also known as undulant fever, Malta fever, Bang's disease, and contagious abortion of

cattle. In humans brucellosis is a debilitating disease with prolonged fever. Man becomes infected from cattle, swine, or goats; rarely, if ever, from humans. It is estimated that 5 per cent of the cattle of breeding age have Bang's disease (brucellosis). Infection occurs from the use of raw (unpasteurized) milk or milk products or from contact with infected animal tissues or secretions during butchering or in handling infected animals or infected meat. Prevention depends upon eradication of brucellosis among domestic animals (vaccination is helpful in accomplishing this), upon the pasteurization of all milk before drinking and before processing into milk products, and upon the use of rubber gloves and antiseptic measures in handling diseased or potentially diseased animals or their products.

## Industrial Health Problems

The conditions under which the millions of employed men and women of this country work are of major importance in the determination of community or national health. Yet

> . . . for years after the development of the modern industrial system, little attention was given to the potential health hazards of such work. All thought was directed toward production. Labor disputes hinged around wages and hours of labor with rarely any mention made of hazards of employment. It was not until the development of systems of industrial compensation and of insurance for illness or accidents that serious attention was directed to these hazards. This early attention was devoted to prevention of accidents, largely through guards about certain forms of machinery. More recently with the rapidly expanding use of chemical processes, industry and labor have become increasingly conscious of the existence of industrial diseases due to exposure to or contact with dangerous chemicals, usually in the form of fumes or dusts that are inhaled. This field of public health has thus expanded from one of mere accident prevention to an increasingly important program of occupational hygiene, or the prevention of occupational diseases.
>
> Both of these fields of industrial safety are based in large part on regulations, imposed in part by the government as an exercise of the police power and by the insurance companies as a condition to low rates for coverage. The latter, while a potent force in the prevention of accidents or disease, are not true expressions of regulating power as they are a part of the insurance contract. It would be grossly unfair, however, to underestimate the force that they have exerted in this field.

The need for industrial insurance has arisen from the enactment of workmen's compensation acts. These have provided for payment to the worker for loss of time due to illness or accident incurred in the course of his employment. Death benefits have also been provided for the dependent. Although the compensation laws vary widely from state to state, the fundamental principle of reimbursement from the employer to the worker is common to all. The employer therefore seeks protection by some form of insurance. The risk to the insuring company quite obviously depends on the nature of the work and the precautions observed by the employer to reduce the hazards attendant upon the industry. A potent force which operates to reduce risks is thus introduced by a law which in its original intent was one of mere compensation for damages.[8]

The chief objective of industrial hygiene is to protect the health of the worker, whether in mines, factories, shops, stores, construction, transportation, farming, lumbering, or domestic work. Rarely is the individual employee, acting alone, able to change the conditions under which he is required to work. This requires group action, with employers, employees, and society working together.

The conditions in industry which most frequently affect health are dusts, fumes, temperature, humidity, light, sanitation, fatigue, hours of labor, medical service, physical examinations, industrial poisons, and accident hazards. From this list it is obvious that industrial hygiene becomes the application of general principles of hygiene to conditions in industry.

In addition to general hygienic considerations such as fatigue, medical care, and sanitation, which are applicable to every industry, there are certain special health hazards which occur in selected industries. Among these are excessive temperatures, air pressure, and a few others which merit special mention even in a brief consideration of the subject.

*Heat cramps*, also called "stoker's cramps," are painful muscular spasms, particularly of the abdominal muscles and of the extremities. They may, however, be so generalized as to simulate epilepsy. They are due to excessive sweating from hard labor in furnace rooms, foundries, metal mines, etc. The patient is usually pale, nauseated, dizzy, and depressed. His temperature is normal and his pulse is rapid but strong.

[8] Anderson, *loc. cit.*

The immediate treatment of all heat-induced disturbances demands removal of the patient to the coolest place available, rest in the recumbent posture, and the supplying of salt and water. The patient should be urged to quench his thirst with water containing a level teaspoonful of salt to a quart. Milk, orangeade, and lemonade should be given every two hours and a physician called. In extreme heat exhaustion, stimulation with coffee or aromatic spirits of ammonia, 15 drops in water, may be beneficial. In heat stroke rapid cooling of the body is imperative. This may be accomplished by removing most of the clothing and sprinkling the patient with a sprinkling can or watering hose, while maintaining a constant current of air by fanning.

*Air Pressure.* The human body adjusts to moderate changes in atmospheric pressure without difficulty, but marked increases or decreases in atmospheric pressure may seriously affect health. Conditions of increased pressure are found chiefly in mines or tunnels. Men can work under these increased atmospheric pressures provided they accustom themselves gradually to the change. The greater pressure causes an increase in the amount of oxygen and nitrogen dissolved in the blood. This produces no ill effects so long as one remains in the high pressure atmosphere, but it may have serious consequences if one passes quickly to an atmosphere of low pressure. With the reduction in atmospheric pressure the excess gases dissolved in the blood are released. The oxygen causes no difficulty because it is immediately taken up by the tissues; but if the reduction in pressure is sudden, the nitrogen, which is not utilized by the body and which takes some time to pass through the membranes separating the blood vessels from the air sacs of the lungs, tends to form bubbles in the blood stream, just as the carbon dioxide in a bottle of ginger ale forms bubbles when the cap is removed. These bubbles are carried along in the blood stream and tend to plug some of the tiny blood vessels. This causes a disease commonly called "the bends," or "caisson disease," the usual symptoms of which are nosebleed, abdominal pain, nausea, vomiting, dizziness, paralysis, and unconsciousness. Prevention of caisson disease depends upon gradual decompression.

Low atmospheric pressures are beginning to have practical health importance with the perfection of airplanes to fly at high altitudes. The difficulties are due both to the rapid change from high to low atmospheric pressures and to the diminished amount of oxygen available in the rarefied atmosphere. The first noticeable signs of oxygen deficiency are impairment of mental concentration, disturbance of muscular coordination, accelerated pulse and respiration. These have been observed at altitudes of 8,000 to 12,000 feet, an elevation frequently used in transcontinental flying. More severe degrees of oxygen deficiency produce faulty judgment, symptoms typical of alcoholic intoxication, hilarity or pugnacity, and instability; and muscular effort causes great fatigue and may injure the heart. Greater degrees of oxygen-want cause unconsciousness and eventual death. To prevent these conditions, aeronautical engineers are perfecting sealed cabins for planes which fly at high altitudes, with oxygen introduced from tanks in order to maintain the desired concentration. Pilots of combat planes are being "conditioned" before taking off and are equipped with special masks for the self-administration of oxygen at high altitudes.

*Dusts.* Certain dusts are dangerous because they are irritating and carry disease-producing bacteria, but others, particularly those containing silica and to some degree asbestos, are responsible for serious lung diseases.

A disease commonly known as "silicosis" and frequently mistaken for tuberculosis occurs among workmen in any occupation in which the inhalation of silica dust is continued over a long period of time. This is most frequent among granite workers, sandblasters, and miners of any type of ore that happens to be mixed with sandstone or granite. Silica does not produce symptoms for years, but the disease once established is usually progressive and eventually fatal. Prevention depends upon the use of adequate exhaust systems to remove the dust, appropriate masks, or water sprays or other means of preventing dust accumulation.

*Lead poisoning* is probably the most frequent and most serious of all the occupational diseases. It is due to the absorption of

small quantities of lead or lead compounds which are absorbed and stored in the body over long periods of time. Painters, pottery workers, printers, and workers in storage battery factories and in numerous other occupations may come in contact with sufficient lead or its fumes or dust particles to produce serious poisoning.

The chief symptoms of lead poisoning are loss of appetite, loss of weight, constipation, colic, weakness, and paralysis. Young people are more susceptible to lead poisoning than older persons, and women more susceptible than men. In a reported series of 212 pregnancies among women lead workers only 61 living children resulted.

In nearly all of the industries using lead it is possible to prevent lead poisoning, but the cooperation of both employer and employee is necessary. Lead usually reaches the worker in the form of dust and fumes or is carried directly to the mouth by the hands. Hence, the prevention of inhalation of dust and fumes laden with lead by means of adequate ventilation, respirators, or masks will do much to protect the worker. In addition the workers must be instructed to wash their hands frequently and always before eating, to take many baths, and to change clothing as soon as they have finished work.

*Shoe-dye Poisoning.* Nitrobenzene, which is often found in shoe dye, is capable of causing serious illness. It may be absorbed through the skin or its fumes may be inhaled. It produces marked cyanosis, which appears suddenly; often within a few hours from time of exposure. The symptoms are shortness of breath, weakness, dizziness, occasionally nausea and vomiting. These are caused by the reduced oxygen-carrying power of the blood, so that in fatal cases death really occurs from suffocation. Usually if the cause is detected and the recently dyed shoes, as well as the stockings, are removed at once, the symptoms disappear within 24 hours.

Prevention consists in using shoe dye that is free from poisonous chemicals, or in allowing all shoes which have been dyed to dry in the sun and wind for at least 3 days before they are worn. After this the feet should be kept dry, even dampness from sweat

should be avoided, and stockings should be changed daily until there is no longer danger of absorption.

*Other Chemical poisons* occur in certain industries, such as phosphorus in the match industry; arsenic in the smelting of certain ores and the curing of furs, hides, skins, and feathers; and mercury in the manufacture of thermometers, barometers, incandescent lamps, felt hats, etc. Poisoning from these chemicals is relatively infrequent and the danger is constantly being reduced.

*Carbon Monoxide Poisoning.* Carbon monoxide is formed by the combustion of carbon compounds in an inadequate supply of oxygen. It is found in highest concentration in the burning of gasoline, coal, illuminating gas, coke, etc.

The poisonous effect of carbon monoxide is due to the fact that it forms a compound with hemoglobin which is from one hundred to two hundred times as stable as oxyhemoglobin. Therefore when carbon monoxide hemoglobin is present, it reduces the oxygen-carrying capacity of the blood and, if present in sufficient quantity, will prevent oxygen from reaching the tissues. The chief sources of carbon monoxide poisoning are coal fires, leaky gas fixtures, and automobile exhausts. A running motor in a small closed garage will produce a sufficient concentration of carbon monoxide to cause death in a few minutes. Most industries now provide protection of their workers against carbon monoxide poisoning. This is done primarily by adequate ventilation.

In domestic life the hazards have not been correspondingly reduced. Improperly adjusted gas burners, leaky gas pipes, rubber hose connections, room or water heaters without proper exhaust outlets, inadequate drafts in coal stoves and furnaces, and automobiles running in closed garages are the chief sources of poisoning with this deadly gas, which can be neither seen nor smelled.

*Industrial accidents* have been greatly reduced in recent years but are still responsible for approximately seventeen thousand fatal and half a million nonfatal accidents, many of which result in permanent disability, each year. The National Safety Council reports that the highest accident rates occur in the following

industries: lumbering, mining, construction, meat packing, farming, etc.

A study of fatal accidents in Pittsburgh several years ago showed that, when it was possible to place responsibility, the victim or a fellow workman and the employer were responsible with about equal frequency.

Employees contribute to accidents because of carelessness, ignorance, physical handicaps (such as poor vision and defective hearing), intemperance, fatigue, certain illnesses (such as epilepsy), or general unfitness for the job. The more important contributory factors to industrial accidents for which the employer is responsible are inadequate illumination, the lack of safeguards for machinery, working conditions which result in excessive fatigue, poor "housekeeping" in the plant, improper upkeep of the building, neglect of safety education of the employees, poor morale, and uninterested and inadequate supervision. Employee and employer working together can do much more to reduce the unnecessary toll which industrial accidents are still taking.

## Housing

Poor health and poor housing cannot fail to be associated in the mind of any physician, nurse, or social worker who has been called upon to see patients in the slums or blighted areas of our cities. Associated, of course, with poor housing are other factors and conditions prejudicial to health: poverty, overcrowding, ignorance, and carelessness about nutrition, hygiene, sanitation and other basic principles of personal health. Typhoid and paratyphoid fever have been reported to be twice as frequent in homes without inside toilets. Communicable diseases of childhood as well as tuberculosis and pneumonia are more prevalent in crowded than in uncrowded houses. Accident rates are consistently higher in old, delapitated houses than in newer, well-maintained ones.

**The effect that housing conditions exert upon the public health has been a subject of endless study, without revealing any definite conclusions. Many attempts have also been made to set up reasonable minimum requirements as to**

construction, lighting, ventilation, size of rooms, and toilet facilities. The purpose of these regulations has been to improve the standards of living, and to reduce the overcrowding that has existed in many of the tenement districts. These requirements have been an expression of the power of the state to regulate conditions under which man must live. In many instances the regulations have been promulgated and enforced by special commissions, in other instances the board of health has been empowered to declare houses unfit for human habitation.

Even though it may not be possible to specify many diseases the occurrence of which has been favored by poor housing conditions, or to measure statistically the effect of such conditions on the general health of the community, few would deny that the exercise of this regulating power has exerted a beneficial effect on the general welfare of the community. The reduction in tuberculosis and infant mortality, for example, has certainly been due as much to the higher standards of living as to the control measures directed against the specific causes of these conditions. Thus as with the control of nuisances, the regulation of housing, by whatever governmental agency it may be carried out, has served to promote the public health. It seems reasonable to predict that in future years even more profound changes will occur, designed not only to eliminate the congestion of certain areas but also to improve the individual homes of the economically poorer classes.[9]

## Economic Status and Health

Approximately a hundred years ago, William Farr, "a physician and citizen of London," published a study which showed that in Liverpool 14 per cent of the children died under five years of age as compared to 4 per cent in rural districts. This was the first study of its kind and it became the basis of governmental action to improve health conditions, particularly in the cities.

In recent years, more detailed studies have been made concerning the health of individuals in rural and urban communities and in various income groups. In general, these studies show that illness and disability are lower in large urban communities than in small towns and villages, and that mortality, illness, and disability are definitely higher among low-income groups. A study in Denver showed a death rate of 168 per 1,000 live births among babies in families of less than $500 annual income as compared to a rate of 30 per 1,000 live births in families with incomes of $3,000 or more. Another study of illness among 9,000 families in

[9] Anderson, *loc cit.*

eighteen states showed that wage earners in families with less than $1,200 annual income lost more than twice as many days per person per year as did wage earners in families with incomes of more than $3,000. The death rate from pulmonary tuberculosis among unskilled laborers is seven times as high, and among skilled laborers three times as high, as among professional workers. The rates for accidents and pneumonia are approximately three times as high among unskilled workers as among professional workers. The death rates from cancer, heart, and kidney diseases are 30 to 50 per cent higher for laborers than for higher salaried groups. From all causes the death rate is 100 per cent higher for unskilled laborers and 25 per cent higher for skilled laborers than it is for those in intellectual pursuits.

The direct causes of these differences are multiple. Poor housing, insufficient food and clothing, overfatigue, worry, and lack of medical care all play a part. It is exceedingly important that the state provide the necessary medical and public health services for this group, but the provision of employment and the improvement of general social and economic conditions are of greater importance in improving the health of these groups than is the provision of more extensive medical service.

*Other Factors in Community Health.* Nutrition, maternal and child welfare, medical and hospital service, prostitution, and the adequacy of public health service are among the other important factors which determine the level of community health. Some of these are of a general nature; others are considered elsewhere in this book

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# APPENDIX A

## Tables of Standard Weight

## STANDARD WEIGHTS FOR MEN*

| Age | 5 Ft. | 5 Ft. 1 In. | 5 Ft. 2 In. | 5 Ft. 3 In. | 5 Ft. 4 In. | 5 Ft. 5 In. | 5 Ft. 6 In. | 5 Ft. 7 In. | 5 Ft. 8 In. | 5 Ft. 9 In. | 5 Ft. 10 In. | 5 Ft. 11 In. | 6 Ft. | 6 Ft. 1 In. | 6 Ft. 2 In. | 6 Ft. 3 In. | 6 Ft. 4 In. | 6 Ft. 5 In. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 16 | 109 | 111 | 114 | 117 | 120 | 124 | 128 | 132 | 136 | 140 | 144 | 149 | 154 | 159 | 164 | 169 | 174 | 179 |
| 17 | 111 | 113 | 116 | 119 | 122 | 126 | 130 | 134 | 138 | 142 | 146 | 151 | 156 | 161 | 166 | 171 | 176 | 181 |
| 18 | 113 | 115 | 118 | 121 | 124 | 128 | 132 | 136 | 140 | 144 | 148 | 153 | 158 | 163 | 168 | 173 | 178 | 183 |
| 19 | 115 | 117 | 120 | 123 | 126 | 130 | 134 | 138 | 142 | 146 | 150 | 155 | 160 | 165 | 170 | 175 | 180 | 185 |
| 20 | 117 | 119 | 122 | 125 | 128 | 132 | 136 | 140 | 144 | 148 | 152 | 156 | 161 | 166 | 171 | 176 | 181 | 186 |
| 21 | 118 | 120 | 123 | 126 | 130 | 134 | 138 | 141 | 145 | 149 | 153 | 157 | 162 | 167 | 172 | 177 | 182 | 187 |
| 22 | 119 | 121 | 124 | 127 | 131 | 135 | 139 | 142 | 146 | 150 | 154 | 158 | 163 | 168 | 173 | 178 | 183 | 188 |
| 23 | 120 | 122 | 125 | 128 | 132 | 136 | 140 | 143 | 147 | 151 | 155 | 159 | 164 | 169 | 175 | 180 | 185 | 190 |
| 24 | 121 | 123 | 126 | 129 | 133 | 137 | 141 | 144 | 148 | 152 | 156 | 160 | 165 | 171 | 177 | 182 | 187 | 192 |
| 25 | 122 | 124 | 126 | 129 | 133 | 137 | 141 | 145 | 149 | 153 | 157 | 162 | 167 | 173 | 179 | 184 | 189 | 194 |
| 26 | 123 | 125 | 127 | 130 | 134 | 138 | 142 | 146 | 150 | 154 | 158 | 163 | 168 | 174 | 180 | 186 | 191 | 196 |
| 27 | 124 | 126 | 128 | 131 | 134 | 138 | 142 | 146 | 150 | 154 | 158 | 163 | 169 | 175 | 181 | 187 | 192 | 197 |
| 28 | 125 | 127 | 129 | 132 | 135 | 139 | 143 | 147 | 151 | 155 | 159 | 164 | 170 | 176 | 182 | 188 | 193 | 198 |
| 29 | 126 | 128 | 130 | 133 | 136 | 140 | 144 | 148 | 152 | 156 | 160 | 165 | 171 | 177 | 183 | 189 | 194 | 199 |
| 30 | 126 | 128 | 130 | 133 | 136 | 140 | 144 | 148 | 152 | 156 | 161 | 166 | 172 | 178 | 184 | 190 | 196 | 201 |
| 31 | 127 | 129 | 131 | 134 | 137 | 141 | 145 | 149 | 153 | 157 | 162 | 167 | 173 | 179 | 185 | 191 | 197 | 202 |
| 32 | 127 | 129 | 131 | 134 | 137 | 141 | 145 | 149 | 154 | 158 | 163 | 168 | 174 | 180 | 186 | 192 | 198 | 203 |
| 33 | 127 | 129 | 131 | 134 | 137 | 141 | 145 | 149 | 154 | 159 | 164 | 169 | 175 | 181 | 187 | 193 | 199 | 204 |
| 34 | 128 | 130 | 132 | 135 | 138 | 142 | 146 | 150 | 155 | 160 | 165 | 170 | 176 | 182 | 188 | 194 | 200 | 206 |
| 35 | 128 | 130 | 132 | 135 | 138 | 142 | 146 | 150 | 155 | 160 | 165 | 170 | 176 | 182 | 189 | 195 | 201 | 207 |
| 36 | 129 | 131 | 133 | 136 | 139 | 143 | 147 | 151 | 156 | 161 | 166 | 171 | 177 | 183 | 190 | 196 | 202 | 208 |
| 37 | 129 | 131 | 133 | 136 | 140 | 144 | 148 | 152 | 157 | 162 | 167 | 172 | 178 | 184 | 191 | 197 | 203 | 209 |
| 38 | 130 | 132 | 134 | 137 | 140 | 144 | 148 | 152 | 157 | 162 | 167 | 173 | 179 | 185 | 192 | 198 | 204 | 210 |
| 39 | 130 | 132 | 134 | 137 | 140 | 144 | 148 | 152 | 157 | 162 | 167 | 173 | 179 | 185 | 192 | 199 | 205 | 211 |
| 40 | 131 | 133 | 135 | 138 | 141 | 145 | 149 | 153 | 158 | 163 | 168 | 174 | 180 | 186 | 193 | 200 | 206 | 212 |
| 41 | 131 | 133 | 135 | 138 | 141 | 145 | 149 | 153 | 158 | 163 | 168 | 174 | 180 | 186 | 193 | 200 | 207 | 213 |
| 42 | 132 | 134 | 136 | 139 | 142 | 146 | 150 | 154 | 159 | 164 | 169 | 175 | 181 | 187 | 194 | 201 | 208 | 214 |
| 43 | 132 | 134 | 136 | 139 | 142 | 146 | 150 | 154 | 159 | 164 | 169 | 175 | 181 | 187 | 194 | 201 | 208 | 214 |
| 44 | 133 | 135 | 137 | 140 | 143 | 147 | 151 | 155 | 160 | 165 | 170 | 176 | 182 | 188 | 195 | 202 | 209 | 215 |
| 45 | 133 | 135 | 137 | 140 | 143 | 147 | 151 | 155 | 160 | 165 | 170 | 176 | 182 | 188 | 195 | 202 | 209 | 215 |
| 46 | 134 | 136 | 138 | 141 | 144 | 148 | 152 | 156 | 161 | 166 | 171 | 177 | 183 | 189 | 196 | 203 | 210 | 216 |
| 47 | 134 | 136 | 138 | 141 | 144 | 148 | 152 | 156 | 161 | 166 | 171 | 177 | 183 | 190 | 197 | 204 | 211 | 217 |
| 48 | 134 | 136 | 138 | 141 | 144 | 148 | 152 | 156 | 161 | 166 | 171 | 177 | 183 | 190 | 197 | 204 | 211 | 217 |
| 49 | 134 | 136 | 138 | 141 | 144 | 148 | 152 | 156 | 161 | 166 | 171 | 177 | 183 | 190 | 197 | 204 | 211 | 217 |
| 50 | 134 | 136 | 138 | 141 | 144 | 148 | 152 | 156 | 161 | 166 | 171 | 177 | 183 | 190 | 197 | 204 | 211 | 217 |
| 51 | 135 | 137 | 139 | 142 | 145 | 149 | 153 | 157 | 162 | 167 | 172 | 178 | 184 | 191 | 198 | 204 | 212 | 218 |
| 52 | 135 | 137 | 139 | 142 | 145 | 149 | 153 | 157 | 162 | 167 | 172 | 178 | 184 | 191 | 198 | 205 | 212 | 218 |
| 53 | 135 | 137 | 139 | 142 | 145 | 149 | 153 | 157 | 162 | 167 | 172 | 178 | 184 | 191 | 198 | 205 | 212 | 218 |
| 54 | 135 | 137 | 139 | 142 | 145 | 149 | 153 | 158 | 163 | 168 | 173 | 178 | 184 | 191 | 198 | 205 | 212 | 219 |
| 55 and up | 135 | 137 | 139 | 142 | 145 | 149 | 153 | 158 | 163 | 168 | 173 | 178 | 184 | 191 | 198 | 205 | 212 | 219 |

* Based on the records of 136,504 women and 221,819 men accepted by American and Canadian life insurance companies. Medico-Actuarial Investigation, Vol. I, The Association of Life Insurance Medical Directors and the Actuarial Society of America, New York, 1912.

## STANDARD WEIGHTS FOR WOMEN*

| Age | 4 Ft. 8 In. | 4 Ft. 9 In. | 4 Ft. 10 In. | 4 Ft. 11 In. | 5 Ft. | 5 Ft. 1 In. | 5 Ft. 2 In. | 5 Ft. 3 In. | 5 Ft. 4 In. | 5 Ft. 5 In. | 5 Ft. 6 In. | 5 Ft. 7 In. | 5 Ft. 8 In. | 5 Ft. 9 In. | 5 Ft. 10 In. | 5 Ft. 11 In. | 6 Ft. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 16 | 102 | 104 | 106 | 108 | 109 | 111 | 114 | 117 | 120 | 124 | 128 | 132 | 136 | 139 | 143 | 148 | 153 |
| 17 | 103 | 105 | 107 | 109 | 111 | 113 | 116 | 119 | 122 | 125 | 129 | 133 | 137 | 140 | 144 | 149 | 154 |
| 18 | 104 | 106 | 108 | 110 | 112 | 114 | 117 | 120 | 123 | 126 | 130 | 134 | 138 | 141 | 145 | 150 | 155 |
| 19 | 105 | 107 | 109 | 111 | 113 | 115 | 118 | 121 | 124 | 127 | 131 | 135 | 139 | 152 | 146 | 151 | 155 |
| 20 | 106 | 108 | 110 | 112 | 114 | 116 | 119 | 122 | 125 | 128 | 132 | 136 | 140 | 143 | 147 | 151 | 156 |
| 21 | 107 | 109 | 111 | 113 | 115 | 117 | 120 | 123 | 126 | 129 | 133 | 137 | 141 | 144 | 148 | 152 | 156 |
| 22 | 107 | 109 | 111 | 113 | 115 | 117 | 120 | 123 | 126 | 129 | 133 | 137 | 141 | 145 | 149 | 153 | 157 |
| 23 | 108 | 110 | 112 | 114 | 116 | 118 | 121 | 124 | 127 | 130 | 134 | 138 | 142 | 146 | 150 | 153 | 157 |
| 24 | 109 | 111 | 113 | 115 | 117 | 119 | 121 | 124 | 127 | 130 | 134 | 138 | 142 | 146 | 150 | 154 | 158 |
| 25 | 109 | 111 | 113 | 115 | 117 | 119 | 121 | 124 | 128 | 131 | 135 | 139 | 143 | 147 | 151 | 154 | 158 |
| 26 | 110 | 112 | 114 | 116 | 118 | 120 | 122 | 125 | 128 | 131 | 135 | 139 | 143 | 147 | 151 | 155 | 159 |
| 27 | 110 | 112 | 114 | 116 | 118 | 120 | 122 | 125 | 129 | 132 | 136 | 140 | 144 | 148 | 152 | 155 | 159 |
| 28 | 111 | 113 | 115 | 117 | 119 | 121 | 123 | 126 | 130 | 133 | 137 | 141 | 145 | 149 | 153 | 156 | 160 |
| 29 | 111 | 113 | 115 | 117 | 119 | 121 | 123 | 126 | 130 | 133 | 137 | 141 | 145 | 149 | 153 | 156 | 160 |
| 30 | 112 | 114 | 116 | 118 | 120 | 122 | 124 | 127 | 131 | 134 | 138 | 142 | 146 | 150 | 154 | 157 | 161 |
| 31 | 113 | 115 | 117 | 119 | 121 | 123 | 125 | 128 | 132 | 135 | 139 | 143 | 147 | 151 | 154 | 157 | 161 |
| 32 | 113 | 115 | 117 | 119 | 121 | 123 | 125 | 128 | 132 | 136 | 140 | 144 | 148 | 152 | 155 | 158 | 162 |
| 33 | 114 | 116 | 118 | 120 | 122 | 124 | 126 | 129 | 133 | 137 | 141 | 145 | 149 | 153 | 156 | 159 | 162 |
| 34 | 115 | 117 | 119 | 121 | 123 | 125 | 127 | 130 | 134 | 138 | 142 | 146 | 150 | 154 | 157 | 160 | 163 |
| 35 | 115 | 117 | 119 | 121 | 123 | 125 | 127 | 130 | 134 | 138 | 142 | 146 | 150 | 154 | 157 | 160 | 163 |
| 36 | 116 | 118 | 120 | 122 | 124 | 126 | 128 | 131 | 135 | 139 | 143 | 147 | 151 | 155 | 158 | 161 | 164 |
| 37 | 116 | 118 | 120 | 122 | 124 | 126 | 129 | 132 | 136 | 140 | 144 | 148 | 152 | 156 | 159 | 162 | 165 |
| 38 | 117 | 119 | 121 | 123 | 125 | 127 | 130 | 133 | 137 | 141 | 145 | 149 | 153 | 157 | 160 | 163 | 166 |
| 39 | 118 | 120 | 122 | 124 | 126 | 128 | 131 | 134 | 138 | 142 | 146 | 150 | 154 | 158 | 161 | 164 | 167 |
| 40 | 119 | 121 | 123 | 125 | 127 | 129 | 132 | 135 | 138 | 142 | 146 | 150 | 154 | 158 | 161 | 164 | 167 |
| 41 | 120 | 122 | 124 | 128 | 128 | 130 | 133 | 136 | 139 | 143 | 147 | 151 | 155 | 159 | 162 | 165 | 168 |
| 42 | 120 | 122 | 124 | 126 | 128 | 130 | 133 | 136 | 139 | 143 | 147 | 151 | 155 | 159 | 162 | 166 | 169 |
| 43 | 121 | 123 | 125 | 127 | 129 | 131 | 134 | 137 | 140 | 144 | 148 | 152 | 156 | 160 | 163 | 167 | 170 |
| 44 | 122 | 124 | 126 | 128 | 130 | 132 | 135 | 138 | 141 | 145 | 149 | 153 | 157 | 161 | 164 | 168 | 171 |
| 45 | 122 | 124 | 126 | 128 | 130 | 132 | 135 | 138 | 141 | 145 | 149 | 153 | 157 | 161 | 164 | 168 | 171 |
| 46 | 123 | 125 | 127 | 129 | 131 | 133 | 136 | 139 | 142 | 146 | 150 | 154 | 158 | 162 | 165 | 169 | 172 |
| 47 | 123 | 125 | 127 | 129 | 131 | 133 | 136 | 139 | 142 | 146 | 151 | 155 | 159 | 163 | 166 | 170 | 173 |
| 48 | 124 | 126 | 128 | 130 | 132 | 134 | 137 | 140 | 143 | 147 | 152 | 156 | 160 | 164 | 167 | 171 | 174 |
| 49 | 124 | 126 | 128 | 130 | 132 | 134 | 137 | 140 | 143 | 147 | 152 | 156 | 161 | 165 | 168 | 172 | 175 |
| 50 | 125 | 127 | 129 | 131 | 133 | 135 | 138 | 141 | 144 | 148 | 152 | 156 | 161 | 165 | 169 | 173 | 176 |
| 51 | 125 | 127 | 129 | 131 | 133 | 135 | 138 | 141 | 144 | 148 | 152 | 157 | 162 | 166 | 170 | 174 | 177 |
| 52 | 125 | 127 | 129 | 131 | 133 | 135 | 138 | 141 | 144 | 148 | 152 | 157 | 162 | 166 | 170 | 174 | 177 |
| 53 | 125 | 127 | 129 | 131 | 133 | 135 | 138 | 141 | 144 | 148 | 152 | 157 | 162 | 166 | 170 | 174 | 177 |
| 54 | 125 | 127 | 129 | 131 | 133 | 135 | 138 | 141 | 144 | 148 | 153 | 158 | 163 | 167 | 171 | 174 | 177 |
| 55 and up | 125 | 127 | 129 | 131 | 133 | 135 | 138 | 141 | 144 | 148 | 153 | 158 | 163 | 167 | 171 | 174 | 177 |

* Based on the records of 136,504 women and 221,819 men accepted by American and Canadian life insurance companies. Medico-Actuarial Investigation, Vol. I, The Association of Life Insurance Medical Directors and the Actuarial Society of Americá, New York, 1912.

# APPENDIX B

## Personal Health Record

A continuous personal health record is exceedingly important for your own and your physician's future reference. Since this is to be a permanent record, check accuracy of "Personal and Family Health History" with parents and family physician. Upon completion of your health examinations request the physician for the information necessary to complete this record.

Name________________________________________________________________

### PERSONAL AND FAMILY HEALTH HISTORY

Date of initial health examination________________________________________

Father: If living, age______Condition of health______________________
If dead, age at death______Cause of death______________________

Mother: If living, age______Condition of health______________________
If dead, age at death ______Cause of death______________________

Paternal grandfather: If living, age ______Condition of health______________________
If dead, age at death______Cause of death______________________

Paternal grandmother: If living, age______Condition of health______________________
If dead, age at death______Cause of death______________________

Maternal grandfather: If living, age______Condition of health______________________
If dead, age at death______Cause of death______________________

Maternal grandmother: If living, age______Condition of health______________________
If dead, age at death______Cause of death______________________

Brothers: Living, ages______Condition of health______________________
Dead, ages at death________ Cause of death______________________

Sisters: Living, ages____ ___Condition of health____________________
Dead, ages at death______Cause of death____________________

Have any of the following diseases occurred among your relatives? If so, indicate what relatives.

| | |
|---|---|
| Tuberculosis or consumption | Convulsions or epilepsy |
| Apoplexy or stroke | Nervous trouble |
| Mental trouble | Diabetes |
| Cancer | Tendency to bleed easily |
| Kidney trouble or Bright's disease | Hay fever |
| High blood pressure | Asthma |
| Heart disease | Hives |
| Sick headaches | Eczema |

Indicate which of the following diseases you have had. If you have had a disease, write the age at which you had it after the name; if you have not had it, write "0"; if you are not certain write "?"

| | | |
|---|---|---|
| Scarlet fever | Measles | Syphilis |
| Diphtheria | Smallpox | Gonorrhea |
| Inflammatory rheumatism | Pneumonia | Whooping cough |
| St. Vitus's dance | Influenza | Malaria |
| Nervous breakdown | Tuberculosis | Chicken pox |
| Typhoid fever | Pleurisy | Heart disease |

Other diseases:
Broken bones. If so, what?
Operations on nose or throat. If so, what?
Other operations?

## IMMUNIZATION HISTORY

Have you been vaccinated against smallpox______Age of first vaccination______ Did it leave a scar_____Age of most recent vaccination______.

Have you been vaccinated against diphtheria______Age______Did you have a Shick test before vaccination______Result______After vaccination_____Result_____Date of most recent Shick test______Result_____.

Have you been vaccinated against scarlet fever_____Age_____Did you have a Dick test before vaccination_____Result_____After vaccination_____Result_____ Date of most recent Dick test_____Result_____.

Have you ever had a Mantoux test______If so, when was the first one and what was the result______If you have had more than one, when and what was the result of the most recent one__________.

Have you had any other vaccinations or inoculations______If so, for what and when
________________________________________
________________________________________
________________________________________

PHYSICAL EXAMINATIONS

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| Dates | | | | | | | | | |
| Age | | | | | | | | | |
| Height | | | | | | | | | |
| Weight | | | | | | | | | |
| Per cent of standard | | | | | | | | | |
| Temperature | | | | | | | | | |
| Vision | | | | | | | | | |
| Color vision | | | | | | | | | |
| Eye | | | | | | | | | |
| Ear | | | | | | | | | |
| Nose | | | | | | | | | |
| Throat | | | | | | | | | |
| Hearing | | | | | | | | | |
| Teeth | | | | | | | | | |
| Hemoglobin | | | | | | | | | |
| Blood pressure | | | | | | | | | |
| Systolic | | | | | | | | | |
| Diastolic | | | | | | | | | |
| Pulse rate | | | | | | | | | |
| Sitting | | | | | | | | | |
| After exercise | | | | | | | | | |
| 2 min later | | | | | | | | | |
| Heart | | | | | | | | | |
| Condition of | | | | | | | | | |
| Lungs | | | | | | | | | |
| Condition of | | | | | | | | | |
| Posture | | | | | | | | | |
| A, B, C, D | | | | | | | | | |
| Mantoux test | | | | | | | | | |
| Shick test | | | | | | | | | |
| Dick test | | | | | | | | | |
| Smallpox vaccination | | | | | | | | | |
| Wassermann test | | | | | | | | | |
| Urine examination | | | | | | | | | |
| X-ray examinations | | | | | | | | | |
| Special examinations | | | | | | | | | |

## APPENDIX B

*Summary of Physical Findings and Health Advice.*

First Examination
(Date)

Subsequent Examinations

1 (Date)

2. (Date)

3. (Date)

4. (Date)

5 (Date)

6 (Date)

7. (Date)

8. (Date)

9. (Date)

10. (Date)

# APPENDIX C

## A Guide to Good Eating

### DAILY REQUIREMENTS

*Milk.* Two or more glasses daily for adults; three to four or more glasses daily for children. To drink and to combine with other foods.

*Vegetables.* Two or more servings daily besides potato: one raw; green and yellow often.

*Fruits.* Two or more servings daily. Include one citrus fruit or tomato.

*Eggs.* Three to five a week; one daily preferred.

*Meat, Cheese, Fish, or Legumes.* One or more servings daily.

*Cereal or Bread.* Most of it whole-grain or "enriched."

*Butter.* Two or more tablespoons daily.

*Other Foods.* To satisfy appetite and complete growth and activity needs.

### A GUIDE TO GOOD EATING*

*A guide to good eating* provides a simple pattern for planning adequate meals. It is a useful tool, devised by nutritionists who have translated dietary needs into common measures of everyday foods. Some indication of the authoritative nature of the recommendations is obtained from the following quotations:

*Milk.* "Milk owes its importance in the diet to the fine quality of its proteins and their supplementary value for the cereal proteins; to the completeness of its assortment of mineral elements and the excellent proportions in which they occur; to the high con-

* Statements in this leaflet have been accepted by the Council on Foods and Nutrition of the American Medical Association. Reproduced by permission of the National Dairy Council, Chicago.

tent of calcium and phosphorus, which makes milk almost indispensable for good growth of bones and teeth; to the liberal amounts of vitamins A and G (riboflavin) which make a quart of milk a day in a good mixed diet a practical guarantee against deficiency of either; and to a considerable amount of vitamin B ($B_1$ or thiamine)."—Mary Swartz Rose, "Foundations of Nutrition."

*Vegetables and Fruits.* "Vegetables and fruits are chiefly important because of their vitamins, minerals, and indigestible residue. . . . It is for their vitamin A and iron especially, but also for vitamin G (riboflavin) that the green leafy vegetables, other green kinds, and the yellow ones should be included frequently in the diet. . . . All fruits and vegetables furnish a little of vitamin B ($B_1$ or thiamine). For vitamin C, tomatoes and the citrus fruits, raw cabbage and raw turnips are valuable."—Rowena S. Carpenter and Hazel K. Stiebeling, "Diets to Fit the Family Income," U.S.D.A.

*Egg.* "Egg-protein resembles milk-protein in nutritional efficiency, and the egg is also a good source of phosphorus and of vitamins A and B ($B_1$ or thiamine) . . . the iron of egg is . . . highly efficient in human nutrition." –Henry C. Sherman and Caroline Sherman Lanford, "Essentials of Nutrition."

*Meat, Cheese, Fish, or Legumes.* " . . . meat may be considered an excellent source of protein of high biologic value. Meat is also a good source of iron. . . . Liver is particularly rich in iron. . . . All the vitamin A of animals is stored in the liver; hence liver is an especially good source of this vitamin. Some meats are excellent sources of vitamin $B_1$ (thiamine) and vitamin G (riboflavin); liver is particularly rich in these vitamins." —Council on Foods of the American Medical Association, "Accepted Foods."

"Cheese (Cheddar) is recognized as a rich source of protein, calcium, and vitamin A and a good source of vitamin G (riboflavin)." –"Accepted Foods."

" . . . dried vegetables are a concentrated source of both energy and protein. . . . Legumes also furnish liberal quantities of phosphorus, iron, copper, and manganese. . . . "—Henry C. Sherman, "Food Products."

*Cereal or Bread.* "Enriched" flour and bread contain the amounts of thiamine, riboflavin, nicotinic acid, and iron prescribed by the Committee on Food and Nutrition, National Research Council.

"The unmilled cereals provide iron, vitamin $B_1$, protein, and calories at low cost."—Jennie I. Rowntree, "This Problem of Food."

*Butter.* "Among animal fats in the more conventional use of the term, butter and cream are outstanding sources of vitamin A in the dietary. . . . Butter is, therefore, both a rich and a reliable source of vitamin A. . . . Any substitution of other fats for butter fat in food is dubious economy in so far as it tends to lower the vitamin A value of the dietary."—Henry C. Sherman, "Food Products."

*Other Foods.* "Eat what you want after you have eaten what you should."—E. V. McCollum and J. Ernestine Becker. "Food, Nutrition and Health."

# INDEX